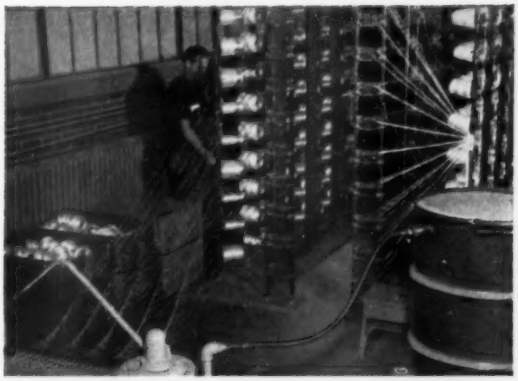
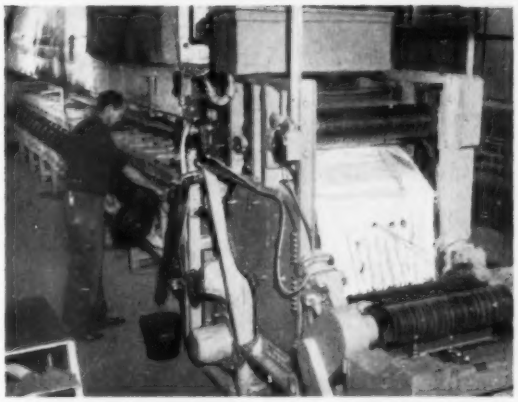
How V-Belts with the Green Seal save you money





Moneysaving performance is built into every Goodyear V-Belt in exclusive manufacturing processes like those illustrated above. Synthetic fiber cords are impregnated repeatedly with special rubber latex compounds. When treated at a precise tension and temperature for a precise time (the exclusive 3-T process), the cords are stabilized at the point of greatest strength before being built into the load-carrying section of Goodyear V-Belts.

They're dimensionally stable – Exclusive 3-T Cords or unsurpassed steel cables muscle belts that don't shrink or stretch in storage. So matched sets *stay* matched. Down time is cut to a new low.

They're precisely measured – The length you need is the length you get. Mismatching failures are minimized.

They're high in modulus, low in stretch – Power loss through "creep" is virtually eliminated. Take-ups are few and far between.

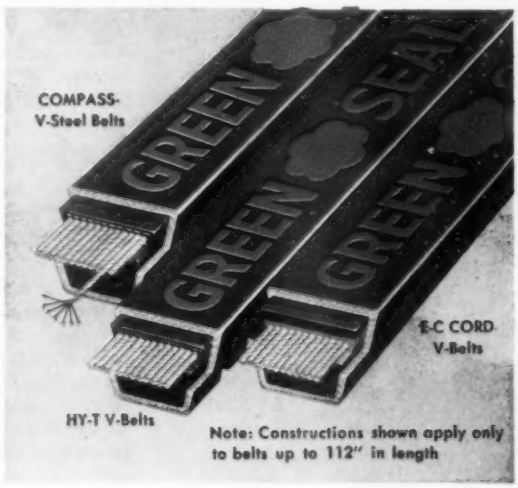
They're friction-balanced, non-dusting – Their covers don't grab or stick in the grooves. They run smoothly and cleanly.

They're mildew-inhibited – They're safely stored and operated in high moisture. Stand-by drives always ready when needed.

–AND IT ALL ADDS UP TO

–Maximum trouble-free horsepower hours at minimum cost. It's reason aplenty that you should use only V-Belts with the Green Seal. See your Goodyear Distributor for details. Or write Goodyear, Industrial Products Division, Lincoln 2, Nebraska, or Akron 16, Ohio.

DIMENSIONALLY STABLE V-BELTS with the GREEN SEAL by



GOODYEAR 60th

THE GREATEST NAME IN RUBBER

Compass, E-C Cord, Hy-T, Green Seal–T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

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'ROUND ABOUT with the editors in field and office

Edited by R. L. Marinello

Plant Engineer Motycka

Arthur Motycka has been appointed plant engineer of A. M. Byers Company's South Side Pittsburgh plant. He joined the company in 1947 as a special engineer, assistant to the general superintendent.

He was formerly associated with Pittsburgh Tube Company of Monaca, Pennsylvania, where he served for five years as plant engineer and two years as chief engineer.

He succeeds O. M. Tishlarich, who retired after 48 years of service with the company.

Plant Engineer Promoted

Eldon W. Menke was recently appointed to the new position of manager of tool and plant engineering of Edward Valves, Inc., East Chicago, subsidiary of Rockwell Manufacturing Co.

He has been employed by the company since 1951. He held the position of plant engineer prior to his current appointment.

Plant Security Manual

PROTECTIVE MEASURES which can be taken by defense plants and government facilities against espionage, sabotage and other subversive activities are outlined in a manual now available to industry.

Security measures include methods for prevention of unauthorized entry; control of the authorized entry of employees and visitors; fire prevention and control; and the prevention of accidents and of air, food and water contamination.

Since no set of standards could be applicable to all industries, the manual provides a general framework which can be adapted to meet the varying security requirements of a particular industry.

The manual "Standards for Physical Security of Industrial and Governmental Facilities," may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., at a price of 30 cents.

Training Technical Secretaries

INDUSTRY MAY find the answer to relieve the shortages of scientific and technical manpower by considering the TESTS (Technical-Engineering-Scientific Training for Secretaries) program. It is designed to train technical secretaries for scientists and engineers.

The program is a special, accelerated 90-week course to be offered by the leading independent business colleges across the country. Textbooks will cover the major engineering-scientific fields, basic science, mathematics and drafting in easy-to-understand language.

Further information about this program may be obtained by writing to TESTS, Dupont Circle Building, Washington 6, D. C.

Plant Maintenance and Engineering Conference

IT'S NOT TOO early to begin planning for next year's Plant Maintenance and Engineering Conference and Show. Cleveland's Public Auditorium will be the site of next year's conference and show and the dates are January 26 through January 29. The conference sessions will be conducted during the first three days.

Further details about the conference, as to the subjects to be discussed and some of the speakers, will appear in this column as soon as the information is available.

How To Conduct a Plant Tour

ARE YOU planning to conduct a tour of your plant? If you are, you will find a lot of helpful hints in the booklet "Plant Tours."

First thing to do is set down defi-

Subscriptions: U.S.A. $10, Canada $11. Other countries $12 per year. Single copies $1. Change of address: Send to PLANT ENGINEERING, Circulation Division, Barrington, Illinois. Please supply position title, company name, company address. Request must reach us by 15th of month to make the change effective with following month's issue. Published monthly and accepted as controlled circulation publication at Chicago, Ill.

Power distribution systems that can effectively handle future demands are the surest way to avoid latter-day costs. Local Graybar Representatives will work with you or your electrical contractor in the selection of wiring and equipment to meet today's needs . . . and tomorrow's.

POWER DISTRIBUTION

proper planning saves future costs

You're building a new plant or planning to expand present facilities. You want an electrical system that will satisfy today's needs yet provide the greatest flexibility for future growth. Calling Graybar is the easiest way to avoid electrical obsolescence, costly rewiring, and plant engineering problems at a later date.

A Graybar Inside Construction Specialist will review your requirements with you or your electrical contractor. From broad experience he can suggest new methods and recommend modern wiring techniques. He can advise in the selection of the latest products available and help determine a power-distribution system that will serve present, near-future and long-range expansion demands.

Over 130 Graybar locations are ready to serve you with complete catalog and quotation information to help you work out job costs and specifications — for lighting, power, control, ventilation, communications as well as wiring.

673-172

An enclosed bus system is today's most efficient method of electrical distribution. Its flexibility and economy are fully explained in this illustrated booklet. If you are located in the U. S., or its possessions, write us for your free copy.

CALL **GraybaR** FIRST FOR

GRAYBAR ELECTRIC COMPANY, INC., 420 LEXINGTON AVENUE, NEW YORK 17, NEW YORK, IN OVER 130 PRINCIPAL CITIES

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NO LUBRICATION
NO MAINTENANCE
NO WEARING PARTS

Future maintenance costs and shutdowns are eliminated when you install Thomas Flexible Couplings. These all-metal couplings are open for inspection while running.
They will protect your equipment and extend the life of your machines.
Properly installed and operated within rated conditions, Thomas Flexible Couplings should last a lifetime.

UNDER LOAD and MISALIGNMENT ONLY THOMAS FLEXIBLE COUPLINGS OFFER ALL THESE ADVANTAGES:

- Freedom from Backlash
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'ROUND ABOUT

nite objectives you wish to attain and then determine the type of tour—open house or special tour. The booklet contains other suggestions as to how to plan an open house, what to do on open house day, completing the tour and keeping in touch. The one page, enumerating the "20 Guideposts to Good Plant Tours," should prove helpful in seeing that every item, big or small, is included in your tour.

Copies of this booklet are available from Business Relations Department, Chamber of Commerce of the United States, Washington, D. C., at 50 cents per copy.

November Conferences

THIRD INDUSTRIAL and Building Sanitation Maintenance Show and Conference is scheduled for Philadelphia's Convention Hall from November 3 to the 6. Forum sessions will discuss such subjects as: costs, training, inspection, equipment, floor maintenance and similar subjects.

General aspects of corrosion and specific corrosion problems will be considered at the Western Region Fall Meeting of the National Association of Corrosion Engineers. The meeting will be held in Los Angeles, California, at the Statler Hotel, from November 17 to 19. A workshop type short course on protection of underground structures and pipelines will be held on November 20 and 21 beginning the day after the end of the regional meeting. It will include practical methods of surface preparation, paint and plastic coatings, pipeline coatings and wrappings and cathodic protection.

A Plastics Conference will be held in conjunction with the Eighth National Plastics Exposition. Dates are November 17 to 21; place, Chicago, Illinois. The conference will be at the Morrison Hotel and the exposition at the International Amphitheatre. For further information, address your inquiry to The Society of the Plastics Industry, Inc., 250 Park Ave., New York 17, N. Y.

Radiation Exposure— What Could Happen, What To Do

IF YOUR PLANT is working with radioactive material, there is always the possible chance of someone being injured because of overexposure.

There are many precautions which should be taken to reduce the chance of overexposure and if any injuries occur, it is important to know what to do.

The booklet "Atomic Radiation" explains the theory, biological hazards, safety measures and treatment of injuries in relation to atomic radiation and should prove of value to those industries working with radioactive material.

This 110-page booklet is divided into five chapters covering: Ionizing Radiation; Biological Effects; Shielding and Monitoring; Medical Evaluation and Care; and Permissible Levels of Exposure.

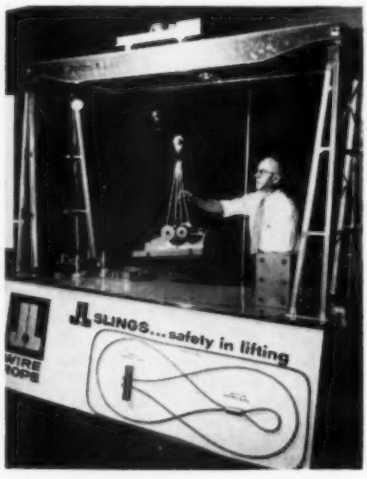
The booklet is available at $1.60 postpaid from RCA Service Company, a Division of Radio Corporation of America, Camden 8, N. J.

Sling Safety School

PROPER USE of slings in overhead crane operation and a review of allied safety principles will be part of the Safety School being conducted by the Wire Rope Division of Jones and Laughlin Steel Corporation.

A model double hook bridge crane will be used to show correct hitching techniques and the proper method of lifting and turning heavy materials. Numerous visual aids will also be used, such as color slides, displays of eyebolts, cable guards, wire rope slings, hooks and clamps, along with typical pieces of equipment that might pose lifting problems.

To find out when this safety School will visit your area, address your inquiry to Jones and Laughlin Steel Corporation, Wire Rope Division, 3 Gateway Center, Pittsburgh 30, Pa.



Electrically-operated model crane will be employed to demonstrate proper use of slings in overhead crane operations.

YOU CAN REPLACE THIS VALVE
WITH THIS SNAP-TITE VALVED COUPLING
NO WAY TO KNOW IF IT'S OPEN OR SHUT WITHOUT TESTING.
TELL AT A GLANCE IF IT'S OPEN OR SHUT . . . NO TESTING.
A CHALLENGING NEW CONCEPT-
AUTOMATIC VALVING

The *instant* the two halves of the Snap-Tite valved coupling are connected there is full, free flow through it. No tedious turning of wheels as in conventional valves. When you want to shut off the Snap-Tite valved coupling, you just pull back the sleeve. You can tell at a glance the line is closed.

Leakage past conventional valves is difficult to find . . . not so with Snap-Tite valved couplings! Further, Snap-Tite valved couplings take up less space. So, why not switch to Snap-Tite automatic valving? Eliminate the possibility of incorrectly set or leaking valves and save time in installation and maintenance. Investigation might show considerable savings.

Sizes ¼″ to 10″ of all machineable metals

For more information, write for Snap-Tite catalog and, if you wish, outline your problem. Your local Snap-Tite representative will be glad to advise you.

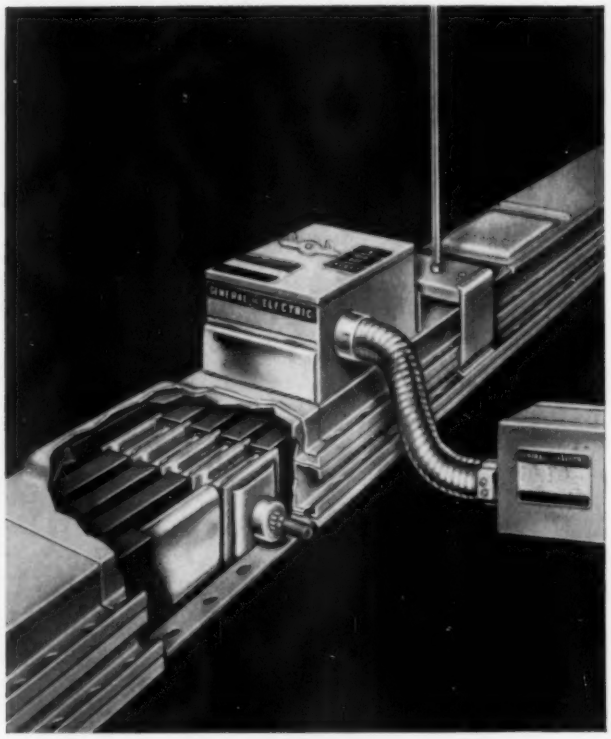
SNAP-TITE COUPLINGS CAN HANDLE ALMOST ANYTHING THAT FLOWS

★Snap-Tite, INC.

UNION CITY 5, PENNSYLVANIA

For more facts circle 505 on Reply Card

4 new ideas in power distrib



New Switchboard

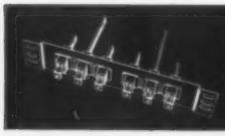
For 600-volt, maximum service, 50-100,000-ampere short circuit rating

Standardization is the keynote in this new Type DR switchboard. Standardization provides greater flexibility, easier installation and more maintenance features than ever before—*at lower total cost.*

Standardization, for example, enables the DR to incorporate any combination of seven protective devices—fusible or circuit breaker types—with complete interchangeability.

Standardization allows units or whole sections to be added, interchanged or removed—quickly, easily—in the field, as load conditions change, and with minimum time and effort. Pre-drilled, pre-formed modular framework and bus bars virtually eliminate the need for field drilling.

For installation and maintenance ease, standardized, centrally located horizontal main busing leaves the top and bottom of the DR clear for busway or cable entrance. No braces or bars to interfere with wiring. All terminals are easily accessible. Ask for a copy of Bulletin GEA-6627.



DR SWITCHBOARD EXTRA VALUE

New stud assembly. Eliminates wire bending—allows "straight-in" wiring—opens up more working space to speed installation. Stud assemblies are mounted on a strong, light-weight, non-magnetic aluminum barrier which minimizes heating.

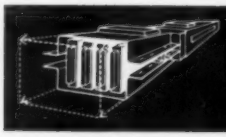
New Busway

ampere for ampere, the smallest, lightest, most efficient and rugged ever designed

New Type DE busway is a totally enclosed plug-in busway with 50,000-ampere short circuit capacity as standard. It is rated 225-1000 amperes, 600 volts maximum, 3 pole or 4 wire, 3 phase. New Type DE busway incorporates all 22 features that engineers, contractors and users say are important in busway design.

DE, for example, installs with unmatched ease. It is up to 50% lighter and 30% smaller than other busways of comparable rating; approved for hanging on 10-foot centers in any position. Sections are electrically joined—quickly, simply—by means of a unique one-bolt, vise-like mechanism that maintains positive electrical contact between conductors with a ton of force. And DE's miniaturized fittings virtually eliminate the need for custom engineering. Result: 30% average saving in installation cost and 10% over-all.

For flexibility, twelve plug outlets come in each 10-foot length. For extra safety, each outlet is virtually dead-front and traveling arcs are essentially eliminated—thanks to Butyl insulation which is extruded over the full length of each bus bar, overhanging bus plug openings. Ask for a copy of Bulletin GEA-6173.



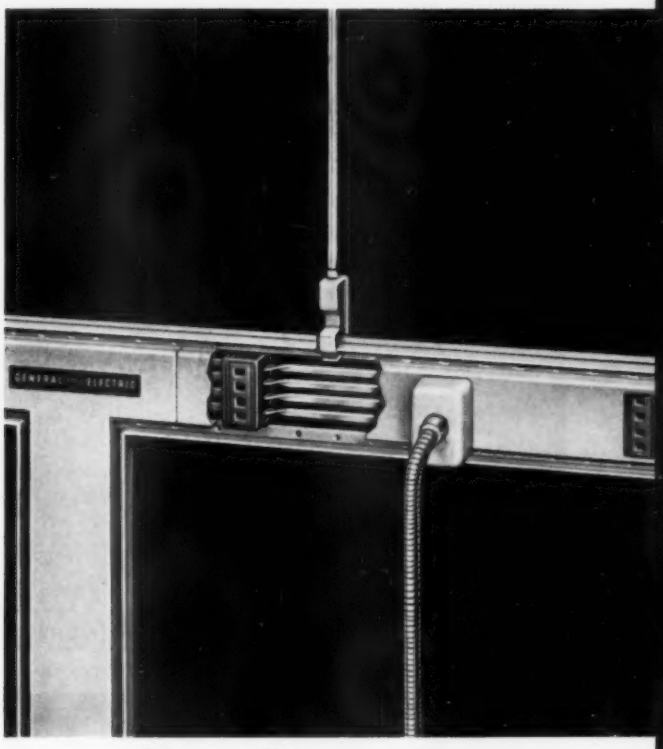
DE BUSWAY EXTRA VALUE

DE busway's telescoping length allows one-foot adjustment (between 36 and 48 inches), precluding need for exacting layout, custom engineering, or special fabrication.

OPERATION up turn
Buy now for extra values
GENERAL ELECTRIC

See your G-E representative or distributor for complete information. You may also obtain complete information on this equipment by writing to General Electric Company, Distribution Assemblies Department, Plainville, Conn.

ution offer more for the money



New Control Center

conserves space, costs less to install, saves money in operation

New compact Type DA7093 Motor Control Center provides an economical, centralized control of A-C motors, up to 200 hp at 600 volts (100 hp at 240 volts).

Compared with individual motor control, initial equipment investment with Type DA7093 is usually substantially lower. At the same time, the '93 affords convenient, economical plant operation and low maintenance. And when load requirements change, the '93 is easily expanded to meet them with standardized plug-in control units in NEMA sizes 1 through 5. Other components, such as meters, instruments, relays and panelboards can be built-in to meet specific needs.

Location of main buses at center of section allows wide, unobstructed pull-box space at top and bottom for easy wiring. Bus bars are silver-plated for positive electrical contact and edgewise mounted for optimum short circuit strength. Standard main bus ratings are 600 or 1200 amperes. Bus bars are braced for fault levels of 25,000 or 50,000 amperes. Ask for Bulletin GEA-6367A.

New Busway

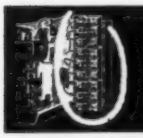
100-ampere plug-in design hailed as the "Wiring Method of Tomorrow"

Now, a plug-in busway that costs no more installed—and usually substantially less—than wire and conduit!

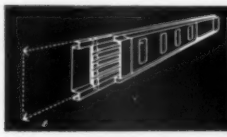
Or as a leading electrical contractor in Wilmington, Delaware, puts it: "With Type DH, I can save 25% over the cost of conduit and wire when there are four or more tap-offs in the system."

Type DH—rated 100 amperes, 3 pole or 4 wire, 3 phase, 600 volts maximum—serves as either a feeder or plug-in system and may be used wherever exposed wire and conduit might be applied. Light, sturdy and small in size (in cross-section not much larger than a pack of king-sized cigarettes), DH may be hung edgewise on 10-foot centers. Eighteen dead-front outlets are provided in each 10-foot length. For added flexibility, each outlet accepts a variety of fusible, no-fuse and circuit breaker plugs.

G-E distributors, *nationwide*, stock Type DH, including its wide variety of fittings and accessories. So DH matches wire and conduit in *availability* as well as cost. Ask for Bulletin GEA-6172.



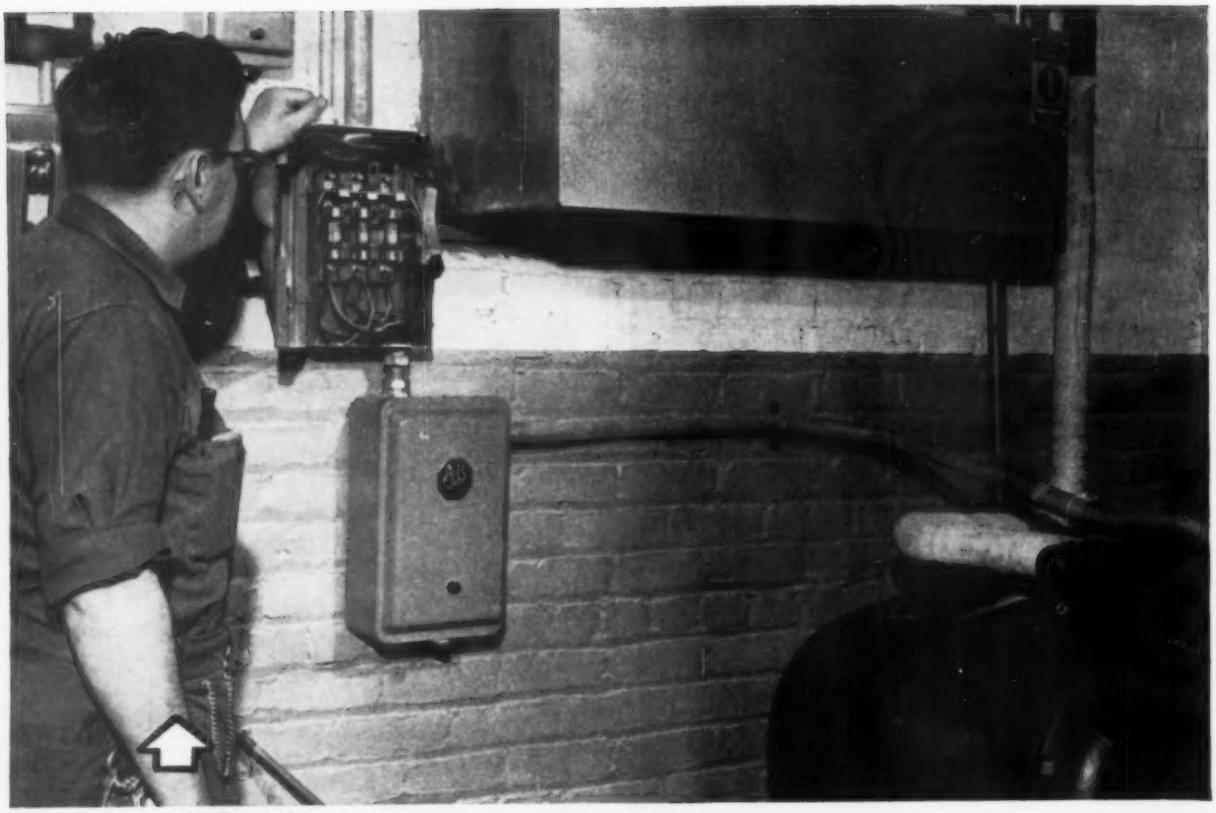
MOTOR CONTROL CENTER EXTRA VALUE
Split Type B terminal blocks (circle) provided on each control unit permit quick, convenient removal of unit without disturbing load and control wiring.



DH BUSWAY EXTRA VALUE
Telescoping length adjusts between 42 and 54 inches. This, plus flexible fittings, eliminates need for exact measurements. Rigid fittings—elbows, crosses and tees—adapt busway to virtually any building contour.

GENERAL ELECTRIC

For more facts circle 506 on Reply Card



Orville L. Welsh ASST. CHIEF ENGINEER, CONTINENTAL BAKING CO.

"Experience proved to us, Fusetron Fuses could save us money and provide safer protection." . . . *Orville L. Welsh*

ASST. CHIEF ENGINEER
CONTINENTAL BAKING CO.
TOLEDO, OHIO

CASE 1

"A refrigeration compressor of ours was frequently being shutdown because the 60 amp. protection we used just could not hold the starting currents.

"After reading over Fusetron dual-element fuse literature sent to us by our company headquarters, we tried them out with great success. In the past twelve months, we have not had to go near the switch or open its cover.

CASE 2

"In another case, Fusetron fuses saved us a considerable amount of money. We installed 600 ampere Fusetron fuses in parallel in our 1200 ampere entrance switch, rather than using the more expensive mechanical type of protective device.

"Personally, I am confident we now have better protection than we could have had with other types of protective devices."

Here's why FUSETRON dual-element fuses provide safer, more dependable and money-saving protection . . . FUSETRON dual-element fuses provide 10 point protection against electrical troubles. This is unlike circuit breakers or ordinary fuses which, except in rare cases, protect only against short-circuits.

IN ADDITION:

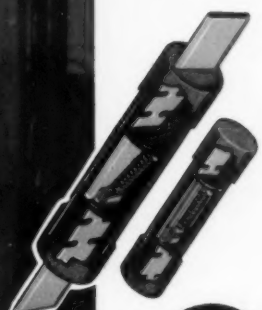
Fusetron fuses require no maintenance or recalibration. They are calibrated at the factory by engineers. Once properly installed, they require no inspection or down-time necessary on mechanically operated devices. There are no hinges, pivots or contacts to stick or get out of order. Dust, corrosion or oxidation cannot increase a Fusetron fuse's capacity or lengthen its blowing time.

After years of inactivity, a Fusetron fuse will give the same safe, dependable protection if called upon to open as it would have on the day it was installed.

Fusetron fuses have high interrupting capacity. FUSETRON fuses can safely interrupt severe short-circuit currents and are adequately safe to meet future circuit growth.

Fusetron fuses save on installation costs. Because their long time-lag prevents them from opening needlessly on motor starting currents or other harmless overloads, Fusetron fuses can be installed in sizes to approximate the load current. This protects against waste of space and money by permitting use of proper size switches and panels.

Why Risk Losses! One needless shutdown . . . one lost motor . . . one destroyed switch or panel . . . one burned out solenoid . . . may cost you far more than replacing all other types of protective devices throughout the entire installation with Fusetron dual-element fuses.



For Loads above 600 and up to 5,000 amps . . . Use BUSS Hi-Cap Fuses. They have an interrupting capacity sufficient to handle any fault current regardless of system growth.

They can be coordinated with Fusetron fuses on feeder and branch circuits to limit fault outages to circuit of origin.

for more information write for { BULLETIN FIS on Fusetron fuses. / BULLETIN HCS on BUSS Hi-Cap fuses.

for safe, modern money-saving protection install FUSETRON dual-element FUSES and BUSS Hi-Cap FUSES throughout entire Electrical System!

FUSETRON
TRUSTWORTHY NAMES IN ELECTRICAL PROTECTION
BUSS

930

BUSSMANN MFG. DIVISION, *McGraw-Edison Company* University at Jefferson, St. Louis 7, Mo.

For more facts circle 507 on Reply Card

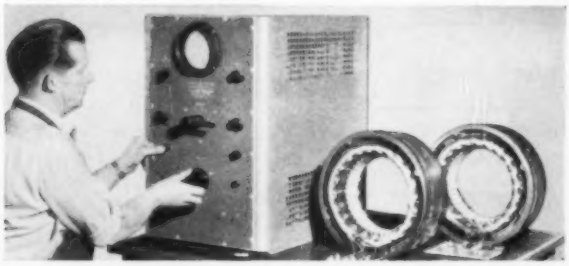
When it's ventilating equipment...

How important is length of service life in ventilating equipment? Is it *most* important to those who specify? Or are there other features that rate even higher?

We wanted to know for sure. So we retained an independent research organization to make a nationwide survey among consulting mechanical engineers to see what

Here's why ILG self-cooled motors, last a lifetime,

Cool Heads . . . and Hands call for Ilg self-cooled motors: No overheating; no "shorts" to shorten fan life. Ilg-built direct-connected motors operate inside a casing . . . draw outside air through vent tube to keep motor running clean and cool. Ilg permanent-split capacitor single-phase and 3-phase motors have lower starting torque, permanently lubricated ball bearings, *no* parts to wear, longer life.



Surge of Power. All Ilg motor windings are Surge-tested by voltages comparable to those induced in power lines by lightning. This turn-to-turn voltage torture test reveals any winding insulation weakness or other variations from specifications.

Dry as Dust. Ilg wound motor cores have no weak spots vulnerable to moisture. Patented Zanderoll process preheats cores, dips them into thermosetting varnish, bakes them until varnish sets and cures. Process assures uniform and complete impregnation of motor windings.

For fans built to satisfy your "specs"...

consulting engineers vote for long life time after time

they looked for in ventilating equipment.

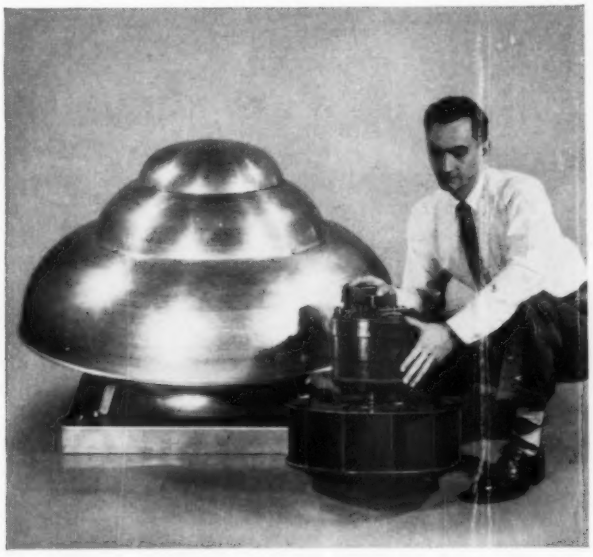
Results? Nearly 75% of the engineers consulted placed *long life* high on their list of "most-looked-for" qualities.

Note below some of the reasons why Ilg fans and ventilators give such *long service* . . . why Ilg equipment has built in many of the other points of preference—such as quietness and vibration-free operation—asked for by consulting engineers.

For further details of why Ilg rates so high with those who specify, send for Catalog No. 153 on propeller fans, Bulletin No. 257 on airfoil centrifugals, Bulletin Nos. 2301 and 2700 on power roof ventilators.

ILG *fans and ventilators cost little to maintain*

Strong, Silent Type. Ilg BC Airfoil Centrifugal Fans can run at greater speed than older types—with *no increase in sound level.* Direct-connected Ilg-built motors and Airfoil fan wheels rotate as a *single unit* . . . eliminate the need for noisy belts and pulleys, space-wasting separate motor mountings, eddy currents and turbulence. Sized for operations to 9" static pressure.

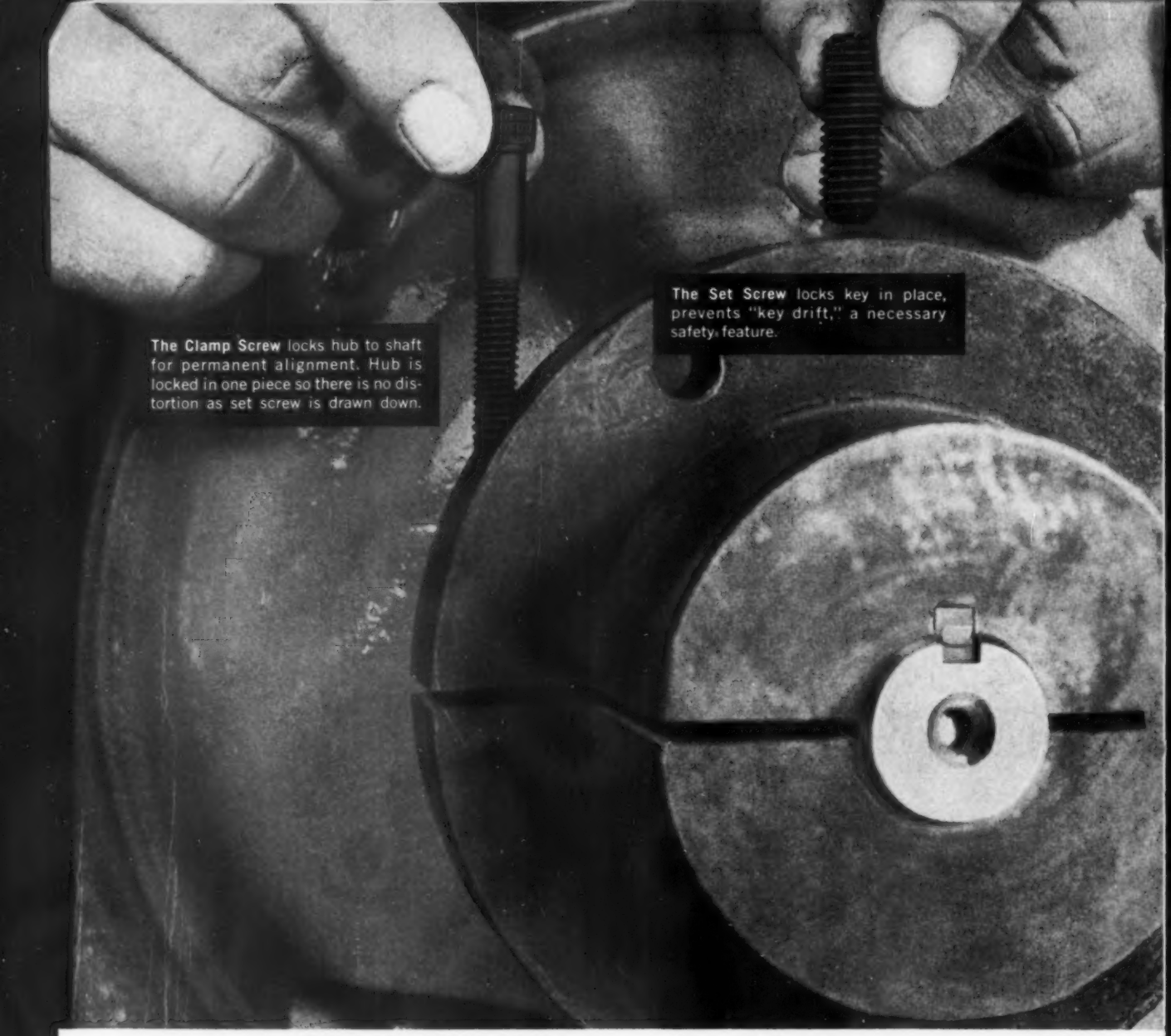


Holds "Heart" in Hands. Under the aluminum housing of this Ilg Power Roof Ventilator "beats" a long-lived, permanently lubricated Ilg motor direct-connected to Ilg's Backward Curved Aluminum Airfoil Centrifugal. Ilg patented pressure-type, self-cooled motor and motor compartment eliminate heat build-up of *any* type, assure longer motor life.

specify ILG

ILG ELECTRIC VENTILATING COMPANY
2832 N. Pulaski Road, Chicago 41, Illinois
Offices in 57 Principal Cities
Member of Air Moving and Conditioning Association Inc. (AMCA)

For more facts circle 508 on Reply Card


The Clamp Screw locks hub to shaft for permanent alignment. Hub is locked in one piece so there is no distortion as set screw is drawn down.
The Set Screw locks key in place, prevents "key drift," a necessary safety feature.

In Worthington QD Sheaves these extra

2 SCREWS MAKE

Exclusive features of Worthington QD Sheaves...

EASY ON! Two-piece design lets you install the sheave *one part at a time*. No heavy rim and hub combination to inch into place; the tapered hub slides easily on the shaft, is locked by the clamp screw for permanent alignment. The set screw locks key. Then the sheave rim slides easily into position on the taper-seat of hub because the large end of taper in sheave starts engagement with small end of taper on hub. Heavy hex-head bolts complete the assembly.

EASY OFF! Remove the big pull-up bolts and use two as jack bolts for easy rim removal. To change speed it's simple to mount a larger or smaller sheave on the hub which, because of clamp screw, remains aligned on shaft. You can install or remove one part at a time.

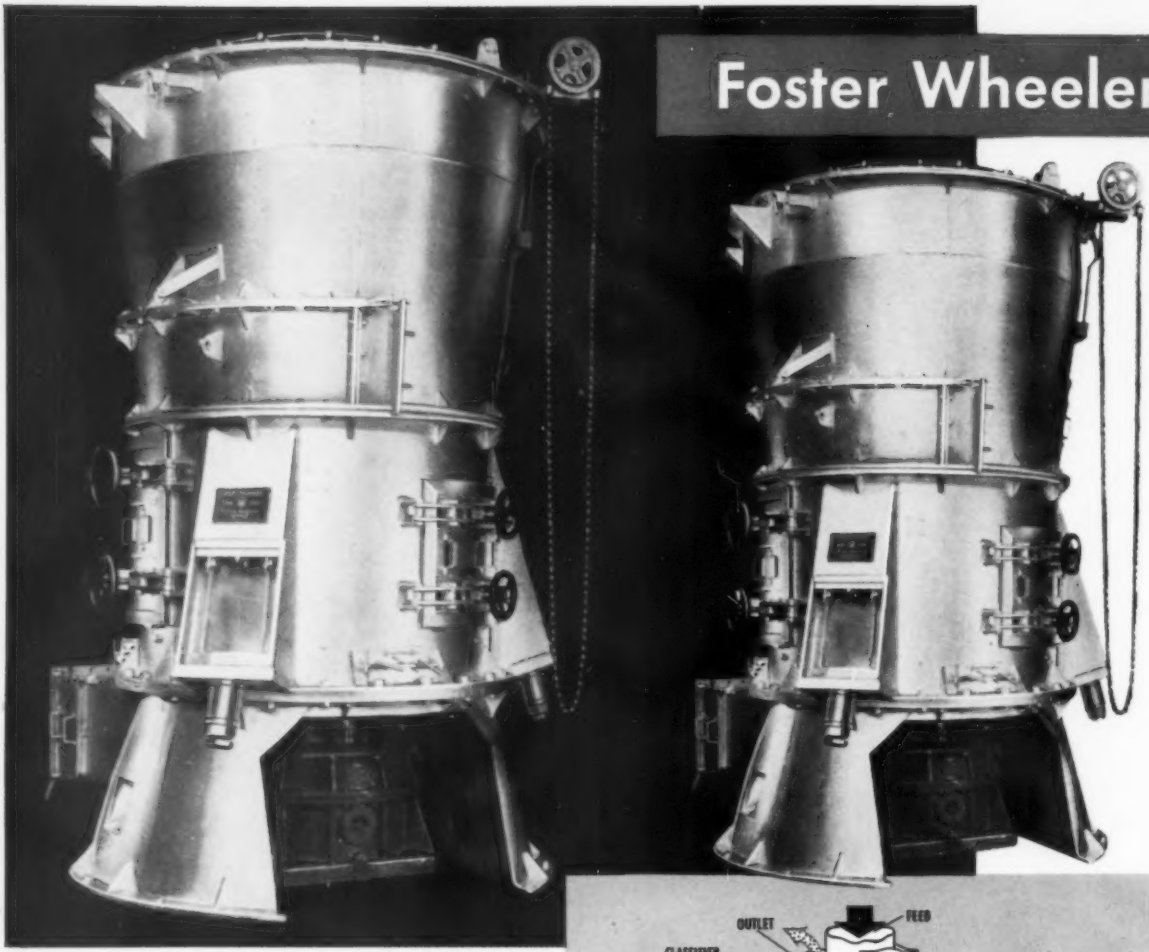
THE DIFFERENCE

ALWAYS TIGHT! Severe shock or reversing loads cannot loosen the sheave. Tightening the pull-up bolts locks the split-tapered hub to the shaft as tight as if the sheaves were integrally cast with shaft. The set screw anchors the key in position.

COMPLETE STOCK! You can get Worthington QD sheave stock service anywhere in the U. S. More than 350 distributors carry Worthington sheaves and Worthington-Goodyear Green Seal V-belts. For 100 page Multi-V-Drive Manual on how to select the right sheave and V-belt write to Section 79-9, Worthington Corporation, Harrison, New Jersey.

WORTHINGTON

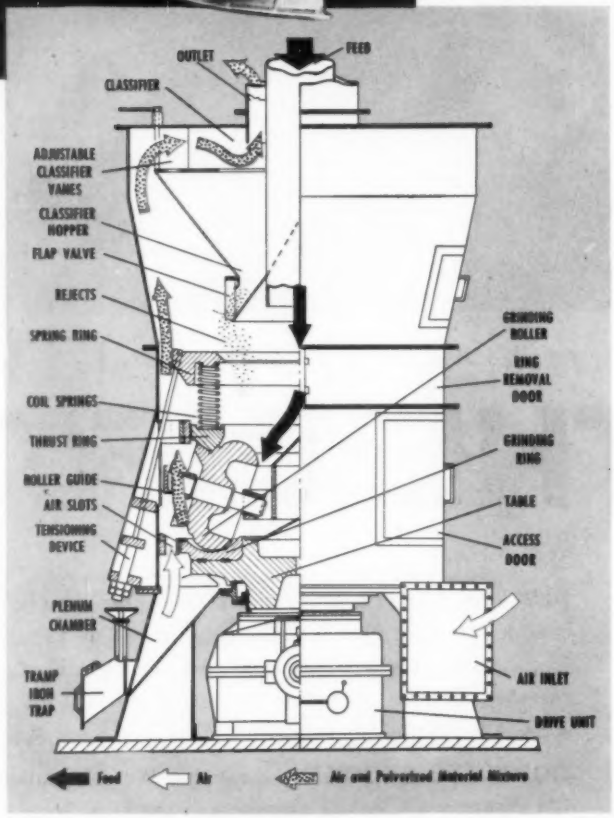
For more facts circle 509 on Reply Card



HOW THE MB PULVERIZER WORKS

In the MB Pulverizer, grinding action takes place between a slowly rotating horizontal table and three spheroidal rollers, uniformly spaced around the table and loaded by the adjustable thrust of a large number of heavy coil springs. The power driven table causes the rollers to rotate while circling planet fashion and rolling over the material on the table. The rollers move up and down independently of each other as required to compensate for foreign matter in the charge.

The charge, entering the mill, is fed directly onto the grinding table, where it is crushed between the table and the rollers. Air entering from below the pulverizer table, floats the ground particles up into the classifier, located in the top of the housing. Particles too coarse to be carried to the classifier fall back onto the table for further pulverization. The classified pulverized fuel is discharged through the outlet at the top of the casing.



"MB" PULVERIZERS

offer proved advantages of

LOW POWER CONSUMPTION and LESS MAINTENANCE

Planetary Roll and Table Design, with 9 years of successful operating experience in Europe, now available in capacities up to 60 tons per hour

THE FOSTER WHEELER Type MB Pulverizer is a simple, compact, planetary roll and table mill for pulverizing solid fuels to commercial fineness with exceptionally low power consumption, low maintenance cost and high availability.

Introduced in Europe in 1949, this type of mill has now had nine years of service experience, with excellent performance records and outstanding economy of operation. Its proved advantages, summarized below, can contribute materially to important savings in the cost of pulverized fuel for large or small steam generators.

Low Power Consumption. Efficient grinding action results in unusually low power requirements per ton of capacity, assuring lower operating costs, year after year.

Low Maintenance. Extremely rugged construction and easy accessibility of all wearing parts reduce down-time for servicing. There are no bearings or lubricated parts subject to dust and heavy pressure. Grinding ring and rollers wear *slowly* and *uniformly* and can be easily replaced when required.

Uniform Product Fineness. Throughout the life of the grinding elements, uniform product fineness is readily maintained without loss of capacity.

Pressurized or Suction Operation. With all moving parts enclosed in a stationary, air-tight casing, the MB Pulverizer can be used for either pressurized or suction operation, providing complete flexibility for various types of firing service.

High Availability. All necessary adjustments for grinding pressure and particle size can be made externally while the mill is in operation, avoiding shutdowns except for periodic inspection or overhaul.

The type MB Pulverizer, with Foster Wheeler feeders, distributors, burners and fans or exhausters, provides a highly efficient and economical pulverized fuel system, supplementing the FW line of heavy-duty Ball Mill systems. For complete information, send for Bulletin MB-58-1. *Foster Wheeler Corporation, 666 Fifth Ave., New York 19, New York.*

FOSTER WHEELER

NEW YORK • LONDON • PARIS • ST. CATHARINES, ONT.

For more facts circle 510 on Reply Card

At Idlewild International Airport

HORTONSPHEROID

stores fuel for $6,000,000 heating system

CB&I Structure complements beauty and efficiency of new facilities

Engineers for the Port of New York Authority wanted both beauty and utility when they specified this 5,000-barrel Hortonspheroid® for the storage of fuel to serve New York International Airport's new central heating plant. High temperature water, generated in the attractive plant, heats all airport central terminal buildings to eliminate duplication of equipment, service and save valuable space. A second pipe system carries chilled water year-round.

Hortonspheroids are the natural way to store volatile liquids safely and stop evaporation losses. They have also been used for the storage of water. Their beauty, utility and high performance standards are another example of how CB&I's complete design, fabricating and erection facilities are helping modern engineers save time and effort.

Write for our new bulletin: CB&I FIELD SERVICES

E54CB

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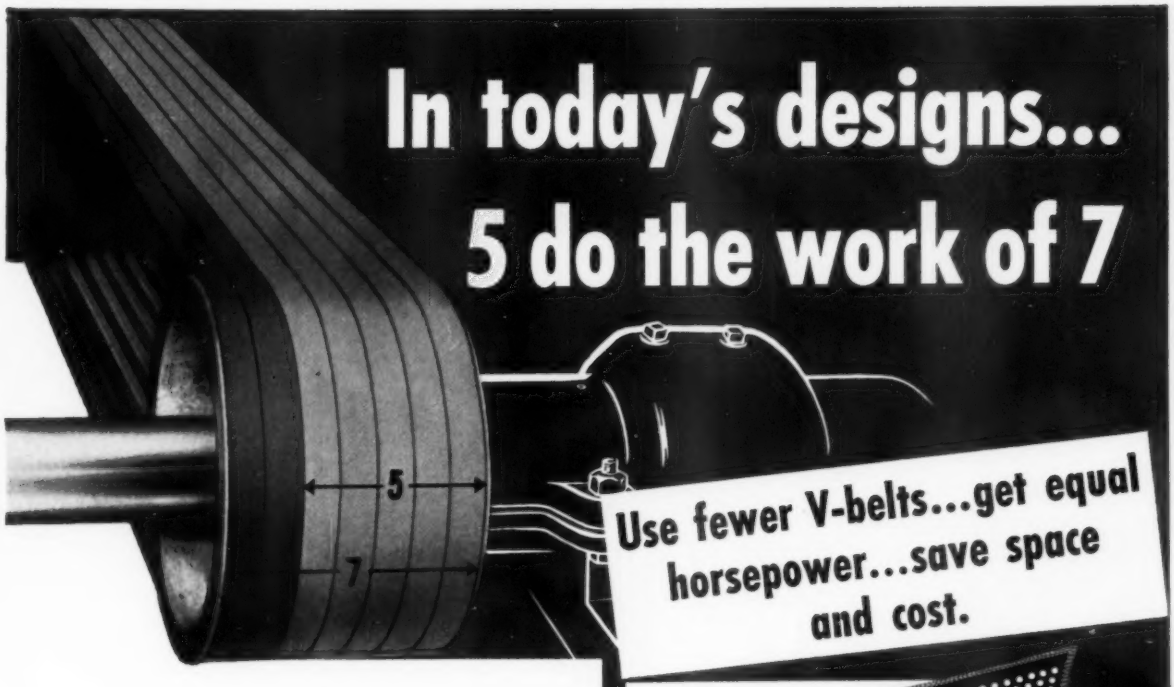
CB&I

In today's designs... 5 do the work of 7



Use fewer V-belts...get equal horsepower...save space and cost.

With 40% more horsepower, 5 Gates Super Vulco Ropes do the work of 7 standard V-belts... improve drive design. That's why—

A Super Vulco Rope Drive delivers more horsepower per dollar invested than any standard V-belt drive.

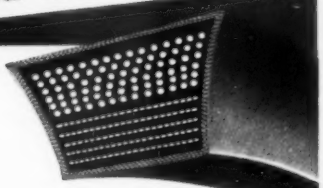
Comprehensive drive data is available to you quickly. Just call your nearby Gates distributor for a Gates V-Belt specialist. Stocks carried in industrial centers throughout the world.

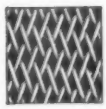
Gates Distributors are in the Yellow Pages

The Gates Rubber Company
Denver, Colorado
World's Largest Maker of V-Belts

Gates® The Mark of *Specialized* Research

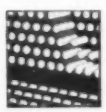
No other V-Belt has ALL these advantages





1. Flex-Weave Cover (U.S. Pat. 2519590)
A Gates exclusive: provides greater flexibility with far less stress on fabric. Cover wears longer... increases belt life...more power available to driven machine.

2. Concave Sidewalls (U.S. Pat. 1813695)
Concave sides (Fig. 1) increase belt life. As belt bends, concave sidewalls become straight, making uniform contact with sheave groove (Fig. 1A). Uniform contact means less wear on sides of belt... far longer belt life.



3. Tough, resilient Tensile Cords
Super-strong resilient tensile cords provide 40% greater horsepower capacity ...easily absorb heavy shock loads... reduce number of belts required... save weight and space.

4. High Electrical Conductivity
Built into Gates Super Vulco Ropes for safer drives (in explosive atmospheres).

5. Oil, Heat, Weather Resistant
Special rubber compounds make Super Vulco Ropes highly resistant to heat, oil, and prolonged exposure to weather.

TPA 331

Gates Super VULCO ROPE Drives

...more Horsepower Capacity

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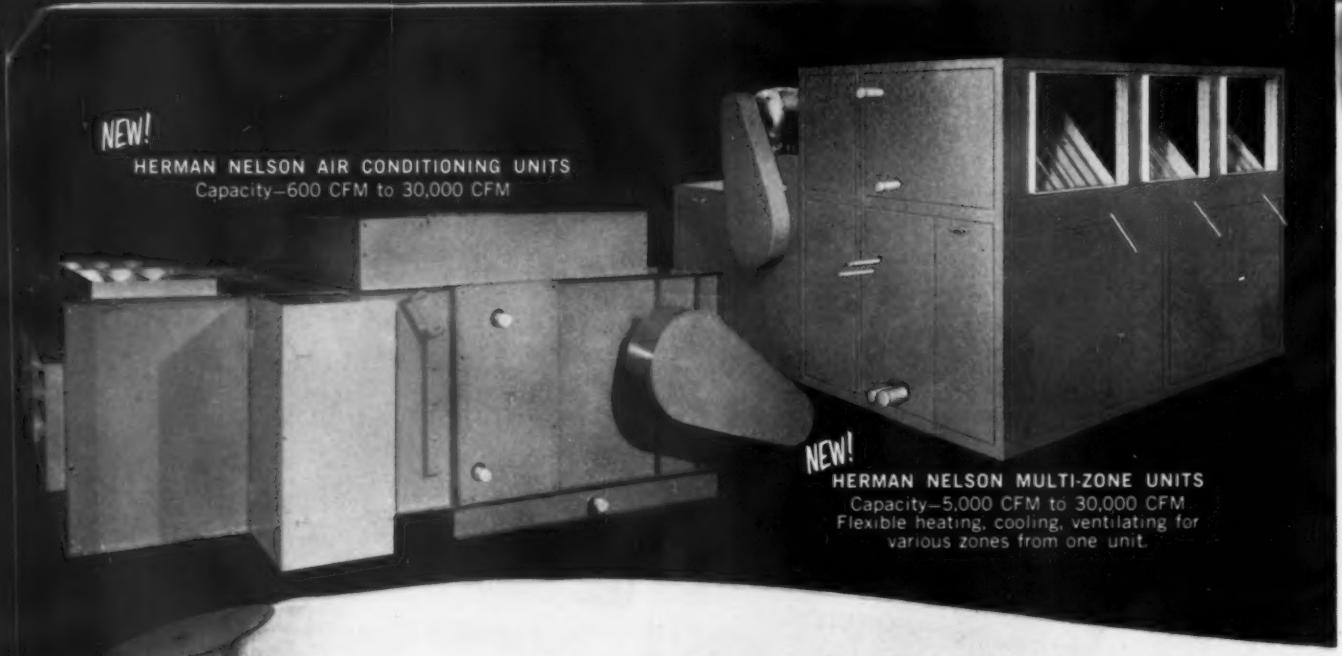


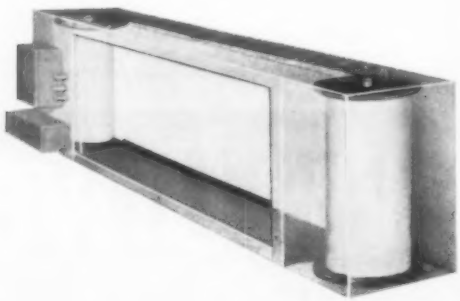
NEW!
HERMAN NELSON AIR CONDITIONING UNITS
Capacity—600 CFM to 30,000 CFM

NEW!
HERMAN NELSON MULTI-ZONE UNITS
Capacity—5,000 CFM to 30,000 CFM
Flexible heating, cooling, ventilating for various zones from one unit.

ALL NEW...AND

Complete new line of heating, ventilating, air conditioning and multi-zone units change their own filters, automatically

These new AAF-Herman Nelson lines incorporate some of the most advanced features found in any heating, ventilating and air conditioning equipment. Outstanding among these features is the exclusive Roll-O-Vent that automatically changes its own filters. It gives you maximum uniform filtering efficiency the year 'round, with little or no maintenance. Air filtering is always constant, because clean media is fed through automatically and at just the right time. One roll of media does the work of about a year's supply of disposable filters, at about one-half the cost. There's nothing to touch—not even a button. Think of the maintenance saving! Plan your new jobs with these AAF-Herman Nelson units . . . *all new . . . and Roll-O-Vent, too!*



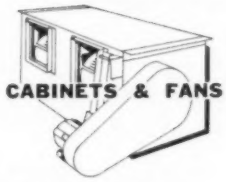
These four great new lines are ready to give you superior performance for any air handling need, large or small. There are 12 basic sizes of each unit—48 in all—handling from 600 CFM up to 65,000 CFM. Sectionalized construction permits installations "tailor made" to your specific requirements.

Better Air is our Business

ROLL O VENT TOO!

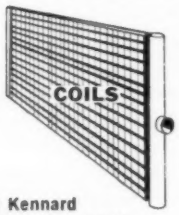
These air handling units are engineered throughout by AAF-Herman Nelson . . . one reliable source to solve all your heating, ventilating and air conditioning problems. Write today for further information.

EVERY AAF UNIT IS ALL American . . . ALL THE WAY!



by Herman Nelson
a Division of AAF
Over 50 years experience in ventilation field.

+



by Kennard
a Division of AAF
Standard of excellence in coils since 1934.

+

by Air Filter
Division of AAF
World's largest manufacturer of air filters.

= ONE MANUFACTURER
ONE RESPONSIBILITY
ONE HIGH STANDARD OF QUALITY

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COMPANY, INC. • 228 CENTRAL AVE. • LOUISVILLE, KY.

For more facts circle 513 on Reply Card

NEW...from APPLETON

24" High-Bay Mercury Vapor Lighting Units

higher production . . . fewer rejects . . . improved employee relations . . . extended safety records

more effective illumination at the work level!

Here is a precision-designed lighting unit for large industrial interiors and high-bay plant areas. High illumination levels without uncomfortable glare... Ventilated hood for lower operating temperature and minimum dirt accumulation... the new APPLETON 24" High-Bay Mercury Vapor Lighting Unit is a unique combination of technical features which give you more useable illumination at the work level. Available in: 1 pc. socket type construction or with the 2 pc. APPLETON DISKONECT time-saving maintenance feature. (Permits both lamp and reflector to be removed as a complete unit without disturbing wiring!) Reflecting surfaces are of ALZAK* processed aluminum. Available for concentrating or spread-type illumination distribution. For use with 1,000 Watt Mercury Vapor Lamps, this new APPLETON 24" High-Bay Mercury Vapor Lighting Unit is designed to meet your specific needs. As with all APPLETON Industrial Lighting Products... you can *see* the difference!

*A proprietory term of Aluminum Company of America

Sold Through Franchised Distributors Only

APPLETON ELECTRIC COMPANY
1701 Wellington Avenue, Chicago 13

Also Manufacturers of:

"ST" Series Connectors

Outlet Boxes

Malleable Iron Unilet Fittings

Reelites

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BULLETINS just released and of immediate plant interest

VALVES, TRAPS, PIPING AND ACCESSORIES

101 Automatic Valves — Condensed Catalog P & H-58, 12 pp, features automatic valves for a variety of industrial applications. Convenient specification tables give valve type, pipe size, rating, and shipping weights. A. W. Cash Valve Mfg. Corp.

102 Magnetic, Motorized Valves—Within its 24 pages Catalog V-58 illustrates and lists specifications of magnetic and motorized valves for use with air, water, gas, steam, oil and refrigerants. Also included are solenoid coil rating tables. Another feature consists of two flow charts—one for liquid, the other for compressible fluids. Dimensions included. The Mercoid Corp.

103 Valve Guide—Featured in 92-pp Catalog 14 is a line of cast and forged steel valves for power, petroleum, chemical, marine, and industrial applications. A visual index in the front shows every valve cataloged, arranged in groups according to type. Other indexes arrange valves by functions and by manufacturer's numbers. Photos showing typical applications included, as well as curves and formulas for correlating valve size and pressure drop, condensed rating tables, and cross section views. Edward Valves, Inc.

104 Butterfly Valves—Features, advantages, dimensions, operators, and technical characteristics of rubber seated butterfly valves for both tight-closing and throttling applications are described in Bulletin 650-R2. Application photos, cutaway views and a dimensional chart are included. Sizing nomograph permits quick selection of valve for a given application. Builders-Providence, Inc., Div. B-I-F Industries, Inc.

105 Bronze Valves — Described in Form 188 are bronze globe and angle valves with full area seat opening and accurate throttling control. Cutaway view showing component parts is included, as well as tables of dimensional data. The Wm. Powell Co.

106 Forged Steel Traps—Catalog 200 describes company's forged steel steam traps for steam tracing and instrumentation service. Operation and installation information is included, as well as physical data and price list, and capacities. Velan Steam Specialties Inc.

107 Manual on Traps — This 40-pp engineering manual is designed to assist in the sizing, specifying and selection of steam traps and other fluid specialties. Includes steam trap selection guide, explanation of four basic types of traps and how they perform their function, four steps to follow in sizing a steam trap, table of factors and detailed instructions on how to select steam traps for over 45 major classes of equipment. Piping details show installation method. The V. D. Anderson Co.

On pages 221-222 are two postage-free Reader Service Cards provided for your convenience in ordering these bulletins. You may also use the cards to order any literature mentioned in ads.

108 Simplified Filtration Piping — Eight-pp Form 158 describes the uses of company's couplings on filtration plant piping in modern water treatment plants. Contains photos illustrating applications on discharge lines, pump and valve connections, raw water lines, chemical lines, and others. Table of sizes and specifications included. Dresser Mfg. Div., Dresser Industries, Inc.

109 Expansion Joints — Information for rating expansion joints subjected to axial or lateral movement, angular rotation or combinations of these movements, together with formulae and tables for calculating forces and/or bending movements developed in the connected piping or equipment are featured in 80-pp Catalog EJC-581. Also included are tables of dimensions and weights for expansion joints from 3 to 72 in. diam. Badger Mfg. Co.

110 Quick-Connect Couplings — This 25-pp general catalog on quick-connect, quick-disconnect couplings, shows types for high pressure use, for impact in air lines, for low pressure use, for vacuum and very low pressure applications, and for hard-to-handle fluids. Includes cutaway drawings illustrating construction details, and graphs and tables giving pressure drop data. Snap-Tite, Inc.

PUMPS, COMPRESSORS

111 Gas Pumps — Six-pp Bulletin XA-458 covers company's rotary positive gas pumps offering a wide range of capacities, pressures and drives. Technical rating data is included, along with detailed design and construction information. Roots-Connersville Blower, Div. Dresser Industries, Inc.

112 Pumps, Valves — Twelve-page Catalog 100 contains basic information on company's pumps, fluid motors and valves, including internal gear pumps, sliding vane pumps and spur external gear pumps and fluid motors. Covers operating principles and internal construction, pump guide selection chart giving operating requirements, construction features, mountings, packing characteristics. Tuthill Pump Co.

113 Industrial Air Compressors — Catalog 37, 20 pp, describes features and advantages of company's industrial air compressors furnished in two-stage or single-stage units. In addition to describing operation, catalog also features ratings and data table, working pressure table, vapor chart, other tabulated engineering data, as well as dimensions, schematic diagrams, and specifications. Brunner Div., Dunham-Bush, Inc.

114 Oil-Less Compressors — Complete details on a comprehensive line of oil-less air compressors and vacuum pumps are given in 12-pp Bulletin GO-1156. Applications, illustrations, specifications included. Bell & Gossett Co.

LUBRICATION

115 Lubrication Equipment — Catalog 65, 32 pp, presents industrial lubrication equipment, including drum pumps and Lubri-guns, pressure primers and pump elevators, measuring valves, hose reels and accessories, also Centr-O-Block lubrication systems. Generously illustrated, book provides brief application suggestions, descriptions of features and selection charts. Lincoln Engineering Co.

116 Planned Lubrication—Twenty-pp Bulletin BK-19-a provides a pre-tested, pre-established list of correct lubricants for specific types of equipment operating under normal conditions of speed and temperature. This aids in selection of right lubricant for the job and also shows how most plant requirements can be met with a minimum of different lubricant types and densities. Characteristics, uses, specifications and densities are listed. Keystone Lubricating Co.

117 Wire Rope Lubrication — Reducing wire rope cost by lengthening its life through proper lubrication is the subject of this 12-pp booklet. Briefly explains why construction of a wire rope necessitates lubrication, lubricants recommended for different types of wire rope and operating conditions, and how to apply lubrication in the field. Union Wire Rope Corp.

MECHANICAL POWER TRANSMISSION

119 Helical Gear Drives — Folder 2651-A, a 6-pp catalog supplement, contains complete data on horsepower ratings, dimensions, mounting information and a résumé of construction principles applying to the quadruple reduction speed reducers. Also contains information on double reduction and triple reduction helical gear drives. Link-Belt Co.

120 Roller Chain Drives — Eight-pp Catalog D-58 provides descriptive information, prices and tabular data pertinent to company's line of roller chain drives. Among items described are bushed type and plate sprockets, interchangeable bushings, bushings for larger sprockets, and single strand and double strand roller chains. Maurey Mfg. Corp.

121 Shaft-Mounted Reducers — Ten-page Booklet B-7238 is an engineering manual featuring selection, horsepower ratings, dimensions, construction, installation and maintenance information for shaft-mounted speed reducing units. Illustrated with photos and cutaway views, it describes how to select shaft-mounted reducers considering AGMA service factors for particular applications. Westinghouse Electric Corp.

BULLETINS

(Begins on page 21)

122 Worm Gear Drive — Eight-pp Bulletin 150 provides useful information on worm gearing in general, points out the advantages of this type of gearing and gives pertinent design and manufacturing facts. Illustrations of typical applications are included. The Cleveland Worm & Gear Co.

123 Variable Speed Belt — Design and operation features of company's variable speed belt which is simply placed around sheave and coupled and is adjustable to any length are detailed in this illustrated bulletin. Manheim Mfg. & Belting Co.

124 Flexible Drive Couplings — Described in this illustrated catalog is a line of flexible drive magnesium alloy couplings. Complete specifications, exploded view photos, and cutaway drawings. Detroit Power Coupling Co.

125 Flexible Couplings — Bulletin 10100A, 8 pp, has been revised to cover new additions to company's line of flexible couplings and includes selection data and other engineering tables. The revised tables also include newly designed couplings with ductile-iron flanges and a special steel retaining ring and specially balanced couplings. T. B. Wood's Sons Co.

126 Bronze Bearings — Indexed Catalog 58, 50 pp, enables easy selection of practically any type of sleeve bearings and bushings required for production and maintenance of machine tools, industrial machinery. Covers 866 sizes of cast bronze stock bearings, 553 stock sizes of plain sintered oil-filled thrust bearings. Also included are 267 sizes of cast bronze 13-in. bars and 84 sizes of sintered oil-filled 6½-in. bars from which bearings can be cut. The Bunting Brass and Bronze Co.

FANS, BLOWERS

127 Fans and Blowers—Catalog 230, 18 pp, presents features and construction data on electric exhaust fans, duct fans, automatic louvers, penthouses, power roof ventilators, direct drive blowers, pressure blowers, radial blade blowers, high speed blowers. Ratings, dimensions and recommended specifications are included, as well as photos, dimensional diagrams. Fan & Blower Div., The Peerless Electric Co.

128 Cycloidal Blowers—Bulletin VP-158, 14 pp, covers cycloidal blowers for vacuum service. Presents design and construction data, technical data on capacities and ratings, and a cutaway view showing design features. Roots-Connersville Blower, Div. Dresser Industries, Inc.

129 Fans, Cyclone Separators — Industrial fans and cyclone separators for use in connection with pneumatic conveying systems are described in 20-pp Catalog Section 500-C. In addition to description of fan types and their uses, it includes standard designations of fan assemblies, drawings of different standard fans, charts of dimensions of various fan sizes, charts of outlet velocities. Fort Worth Steel & Machinery Co.

MATERIALS HANDLING

130 Roller Wheel Conveyors — Catalog 156 contains 68 pp of detailed information and illustrative material on company's roller and wheel conveyors. Light and heavy duty wheels, and complete line of conveyor rollers are covered. Specifications, ratings and dimensional diagrams and data are included. Mathews Conveyer Co.

131 Steel Belt Conveyors — Eight-pp. Technical Bulletin 200 is an engineering guide to steel belt conveyors used for conveying materials through ovens and cooling tunnels, handling foods and chemicals, handling parts and other applications. Nomographs, tables, line drawings, and graphs which simplify calculation of dimensions, horsepower requirements. Sandvik Steel, Inc.

132 Roller Conveyor — Twelve-pp Bulletin RR-58 describes the Rapid-Roller gravity conveyor, designed to handle a variety of palletized, packaged and bagged materials. Typical applications, construction features and selection details are covered, and specifications, weights and capacities presented in charts and tables. The Rapids-Standard Co., Inc.

133 Self-Dumping Hopper—Described in Bulletin 260 is a self-dumping hopper for low-cost handling of wet or dry, hot or cold, bulk materials. A variety of standard models are pictured and described and construction data furnished. Roura Iron Works, Inc.

134 Cutting Handling Costs — An analysis of many facets of material handling and suggestions for effecting economies are outlined in this 12-pp brochure. Suggests ways to streamline and economize handling procedures. Consideration is given to equipment, design and construction, conveying, storage, delivery, unloading, safety and administration. Manpower, Inc.

135 Materials Handling — Described in this 24-pp catalog are casters, institutional, commercial, and industrial floor trucks, and materials handling equipment. Included are some 12,000 casters, special use dollies, platform trucks, light, medium and heavy duty hand trucks, lift jack systems, Structo steel angles, conveyor systems, hydraulic lift trucks, lift tables and special lifting devices. The Colson Corp.

CONSTRUCTION

137 Corrugated Sheets — How this company's deep corrugation sheets support greater loads, cut costs, reduce weight and save purlins is detailed in this product bulletin. Comparative safe loads and wider purlin spacing are illustrated, and a safe load vs purlin chart is included. Armco Steel Corp.

138 Reinforced Plastic Panels — Advantages of using polyester glass-reinforced plastic panels for industrial buildings are detailed in this 8-pp bulletin. Photos illustrate typical installations. Rippolite Plastic Products, Inc.

139 Hollow Metal Doors — Described in 28-pp Catalog 1040-F are hollow metal doors, frames and hardware. Various types of hollow metal doors in flush and panel styles are detailed, as are jalousie and louver doors. In addition, transom frames, side-lights, and borrowed lights are included and construction details are also provided. Ceco Steel Products Corp.

INSULATION

140 Industrial Insulation—This 18-pp handbook is dedicated to presenting fundamentals of industrial insulation and some of the problems encountered in its application. Cast in question and answer form, catalog also covers special considerations of high and low temperature insulation. The Aber Co.

141 Insulation Fittings — Outlined in this folder are the characteristics of company's line of prefabricated insulation fittings. Physical composition of product, temperature range, sizes, prices are covered. The Aber Co., Inc.

ELECTRICAL

142 Secondary Substations — Detailed information on secondary unit substations—compact load distribution centers for indoor or outdoor applications—is in 24-pp Bulletin 3104-1A. Provides data and specifications on primary devices, transformers, and secondary switchgear offered. Bulletin is divided into three sections covering general information, component dimensions and weights, and electrical characteristics. I-T-E Circuit Breaker Co.

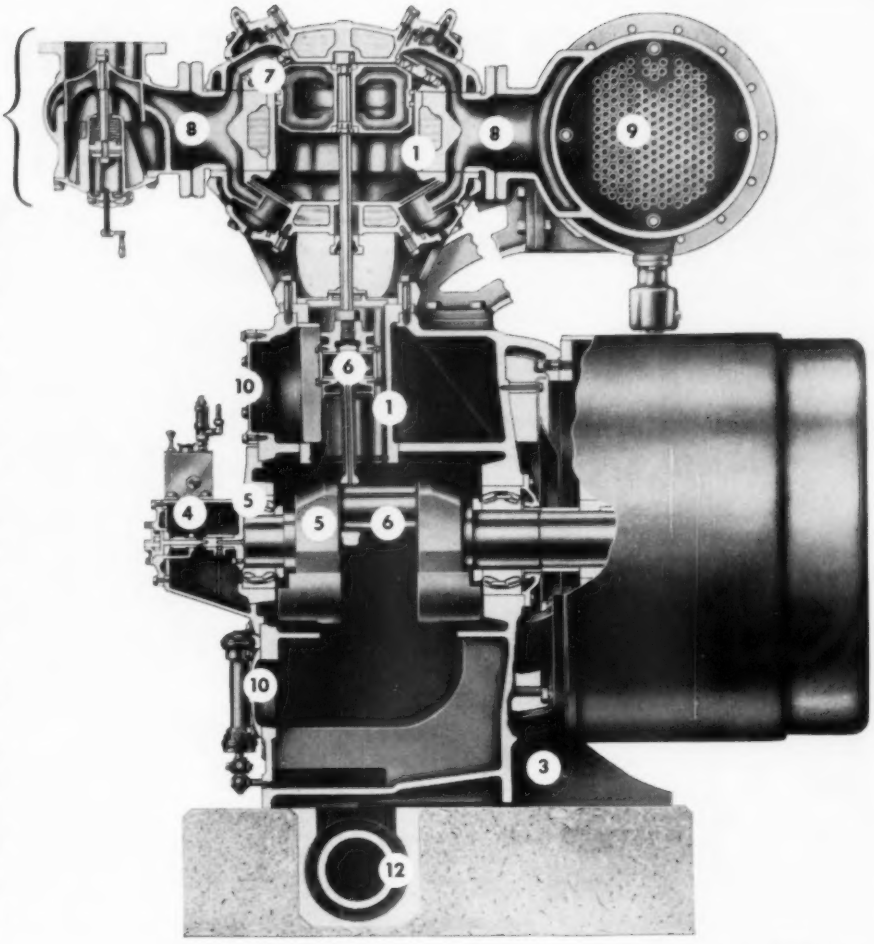
Postage-free Reader Service Cards make it easy to order bulletins. Cards are provided on pages 221-222.

143 Starting Synchronous Motors — Bulletin GER-1520, 10 pp, describes methods of starting synchronous motors. Discusses full-voltage, part-winding, autotransformer, primary resistor, primary reactor, and wye-delta starting and field excitation. A section is devoted to a discussion of synchronous motor operating characteristics affecting control. General Electric Co.

144 Pump Motors — This 26-pp liberally illustrated and charted instruction manual covers both Verticlosed oil-lubricated and grease-lubricated pump motors. Installation instructions are given on mounting, oil-fill, electrical connection, mechanical connection, and use of upthrust protection. Operating instructions include guidance on ventilation, first-time starting and stopping check-list, shutdown protection, and lubrication. Tables of recommended oils and greases included. U.S. Electrical Motors Inc.

145 Control Centers—A line of push-button controlled electri-centers is illustrated and described in this 8-pp bulletin. Along with descriptive data, it includes wiring diagrams and knock-out plans. Bulldog Electric Products Co., Div. I-T-E Circuit Breaker Co.

(More Bulletins on page 223)



1. Honed, replaceable crosshead and cylinder liners of special alloy iron.
✓ One-piece, box type tinned cross heads—NO ADJUSTMENT NECESSARY.
3. Scientifically ribbed, broad based main frame of semi-steel.
4. Integral force-feed running gear lubrication through rifle-drilled passages. Separate force-feed system for cylinders.
5. Heat-treated, drop-forged crankshaft and spherical-roller-type main bearings. NO ADJUSTMENT NECESSARY.
6. Precision type, steel back crankpin bearings and bronze crosshead pin bearings, force-feed lubricated.
7. Patented "Dual-Cushion" Valves—large area, low lift, durable, efficient and quiet, set at most efficient angle in both heads.
8. Large, streamlined air passages minimize friction losses, reduce power consumption.
9. Dual copper tube intercoolers with cast iron shell for quiet operation, true counter flow design and built-in moisture separator
10. Convenient inspection openings with dust proof, oil-tight covers.
✓ Water jacket cleanout openings.
12. Discharge piping furnished provides single outlet for easy installation.
13. Standard Joy total closure control provides lowest possible power consumption. Other control systems available.

Mr. Engineer: Here are some BUY features of JOY AIR COMPRESSORS

There are three major by-products of the BUY features listed above; they are savings in *installation, maintenance* and *operation.*

INSTALLATION: Because of "Packaged" design, Joy Compressors are shipped ready to hook up and run. No assembly needed. And you save up to half the normal cost because Joy Compressors require less foundation.

MAINTENANCE: All wearing parts—valves, crosshead guides, cylinder liners, etc.,—are field replaceable. This is an exclusive Joy feature. No special tools or special maintenance crew training required.

OPERATION: Precise balance and control requires less horsepower than any other system, delivers greater economy on CFM and KWH per HP.

Joy Compressors range from 1.93 to 6048 CFM with wide choice of Prime movers and drives. Write **Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.** Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

WRITE FOR FREE BULLETIN 242-15

JOY *Saves you money on AIR*

COMPRESSORS • FANS • DUST COLLECTORS

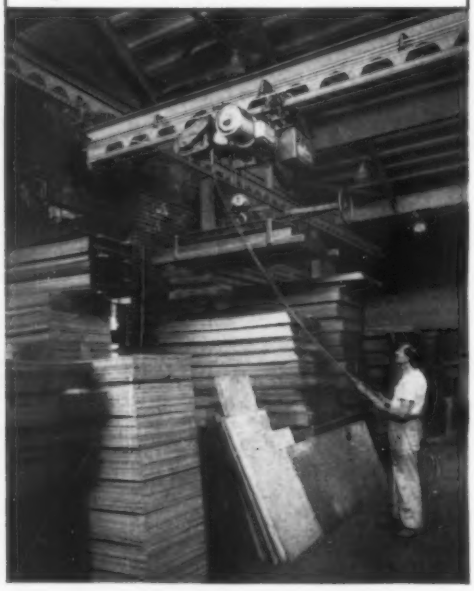
WSW I 7162-242

For more facts circle 515 on Reply Card

TRANSFER CRANES ***SIMPLIFY*** Sheet Steel Handling

It is easy to maintain a neat, orderly warehouse with this 5000 lb. capacity completely motorised transfer crane system. (Many warehouses prefer 10,000 lb. systems which enable the handling of 5-ton packages of steel, unbroken as they come from the mill.)

No trick at all to pile the heavy sheets high with a Tramrail crane and hand-operated grab.



TWO cranes on adjacent runways cut the cost of handling sheet steel in the modern warehouse of Eastern Steel Products, Ltd., Toronto. They enable one man to handle heavy packs quickly and make it easy to maintain orderliness.

The Tramrail System permits far more steel being stored in the building because it can be piled high and because wide aisleways required for floor conveyances are not necessary; thus, much of this space can be used for storage.

The overhead Tramrail cranes are always on the job, always within easy reach. They require extremely little maintenance, usually far less than needed for power-driven floor trucks. Further, there is no floor wear with cranes and this alone represents a considerable savings.

Being of the transfer type, the cranes may be interlocked with a common crossover track, permitting a hoist carrier with load being transferred from one crane to the other. Thus, loads can be delivered directly between any points covered by the cranes without in-between handling.

***WRITE FOR FREE COPY** of Engineering and Data Booklet No. 2008. Packed with valuable information. Profusely illustrated.*

CLEVELAND TRAMRAIL

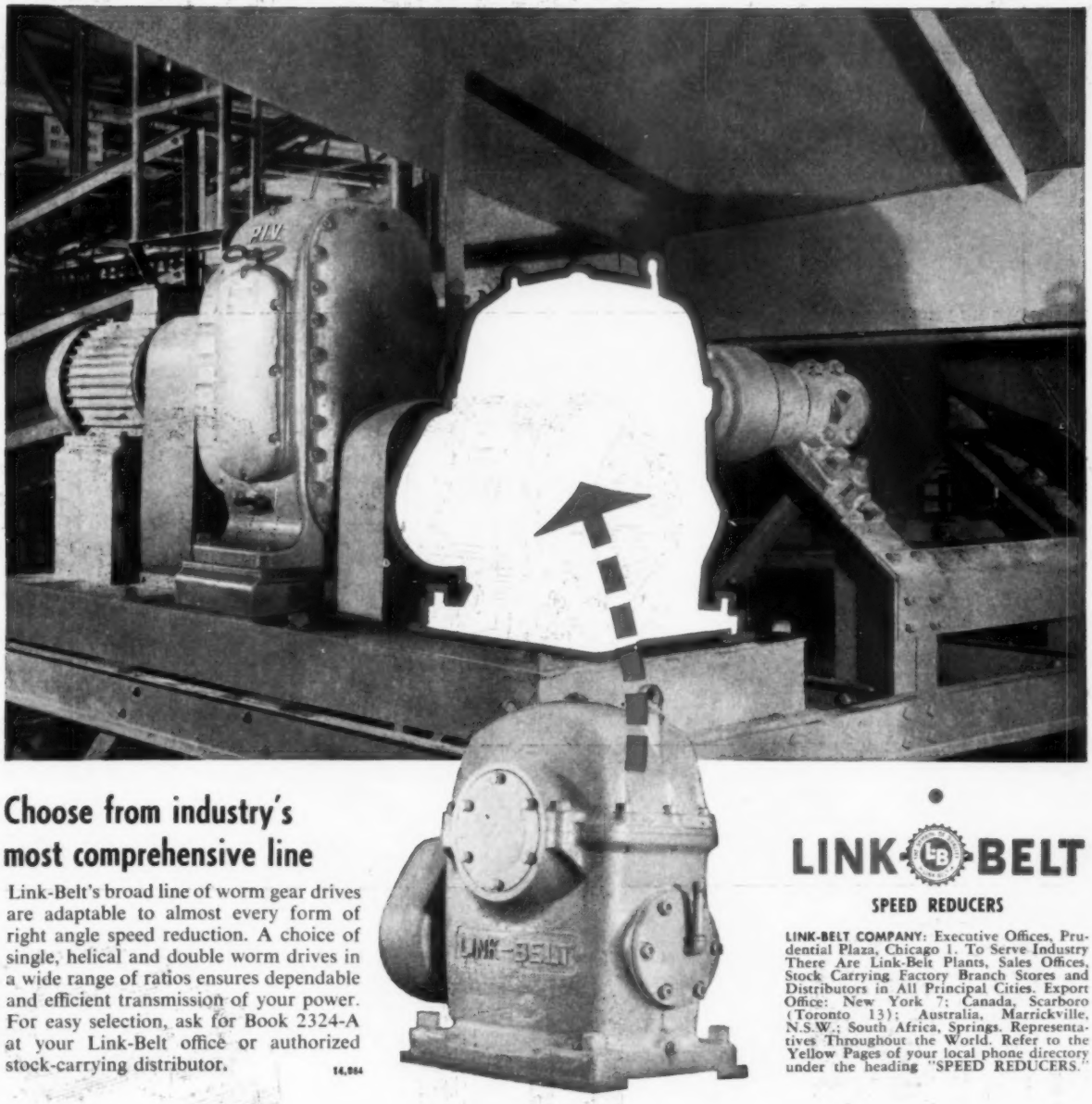
Overhead Materials Handling Equipment

CLEVELAND TRAMRAIL DIVISOIN • THE CLEVELAND CRANE & ENGINEERING CO. • 7524 E. 290 ST. • WICKLIFFE, OHIO

For more facts circle 516 on Reply Card

If it's high-ratio speed reduction in limited space... it's a

spot for a LINK-BELT Worm Gear Drive



Choose from industry's most comprehensive line

Link-Belt's broad line of worm gear drives are adaptable to almost every form of right angle speed reduction. A choice of single, helical and double worm drives in a wide range of ratios ensures dependable and efficient transmission of your power. For easy selection, ask for Book 2324-A at your Link-Belt office or authorized stock-carrying distributor.

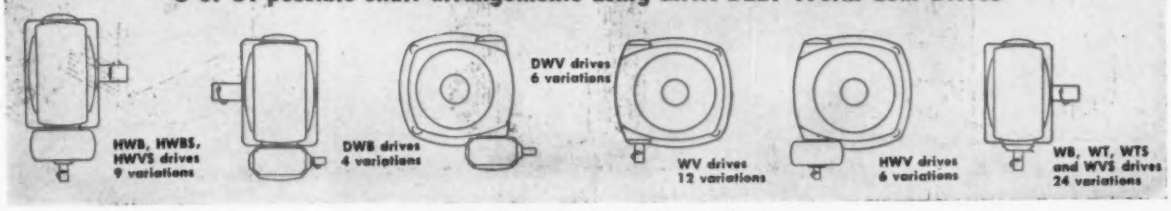
14,084

LINK-BELT

SPEED REDUCERS

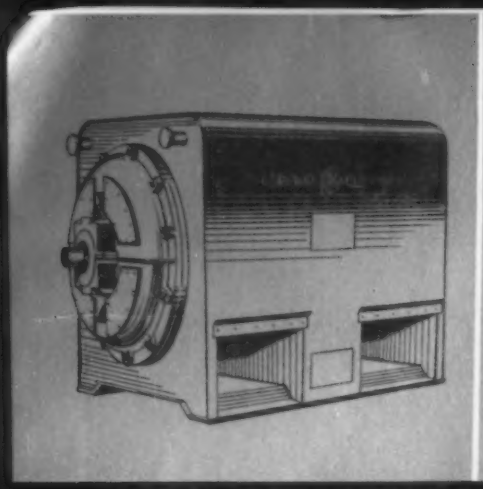
LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. Refer to the Yellow Pages of your local phone directory under the heading "SPEED REDUCERS."

6 of 61 possible shaft arrangements using LINK-BELT Worm Gear Drives

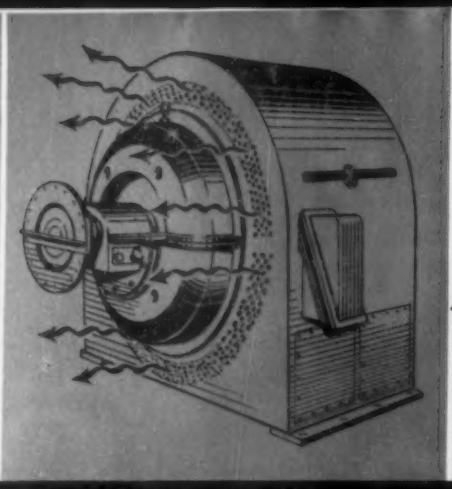

HWB, HWBS, HWVS drives 9 variations
DWB drives 4 variations
DWV drives 6 variations
WV drives 12 variations
HWV drives 6 variations
WB, WT, WTS and WVS drives 24 variations

For more facts circle 517 on Reply Card

For more facts circle 518 on Reply Card →

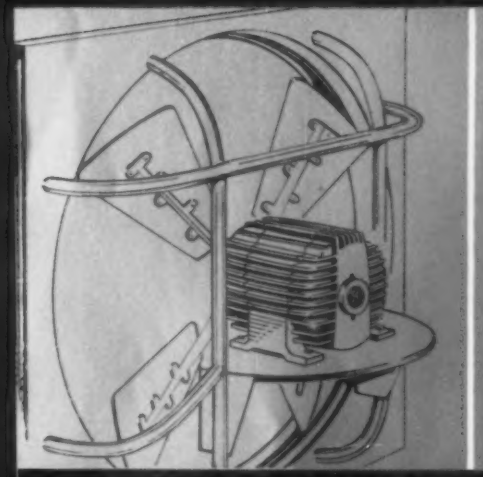


NEW WEATHER PROTECTED MOTORS —over 3 hp per rpm and above—are custom designed to give NEMA type II protection where totally enclosed motors cannot be economically justified. GEZ-2771.

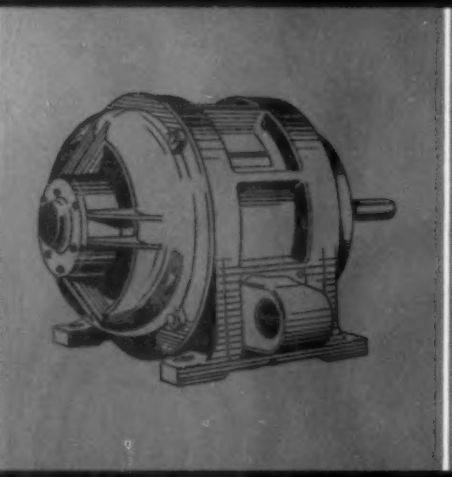


TUBE-COOLED VENTILATION provides more effective cooling for very large, totally enclosed motors. A fan forces air through specially-designed tubes in motor frame, achieving maximum heat dissipation.

"SHOT BLASTING" OF WELDMENTS on large G-E motors prepares surfaces for longer-lasting finish. Tiny steel pellets are blasted at frames to clean away welding flux, dirt, etc., before painting.



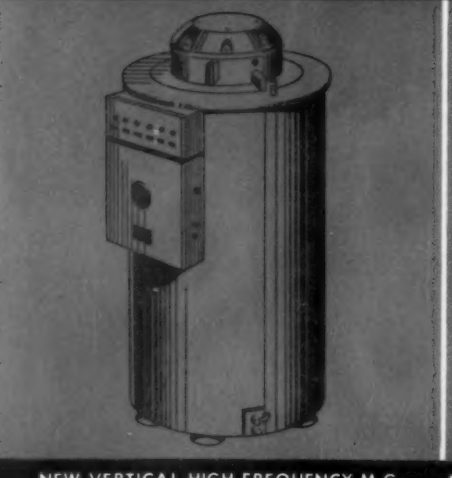
NEW TOTALLY ENCLOSED AIR-OVER MOTOR—7½ to 100 hp—achieves more efficient air flow at lower cost. Permits higher full-load speeds, greater fan output. Up to 20% smaller, 30% lighter. GEA-6598.



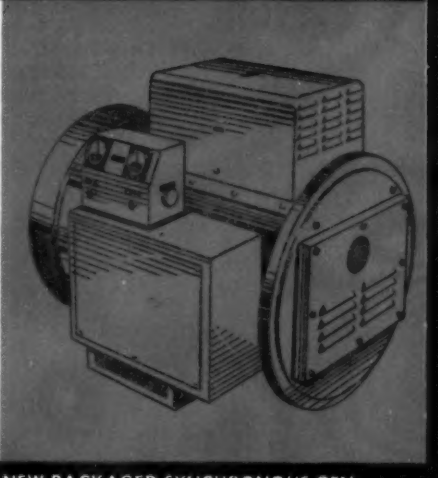
NEW COTTON GIN MOTOR—30 to 100 hp—has oversize shaft and bearings (up to two sizes larger) for greater reliability and longer life. Smooth open design achieves maximum lint expulsion. GEA-6765.

NEW SLUSHER HOIST MOTOR—up to 125 hp—provides greater burnout protection through increased stall capacity and greater stability under extreme loads. Designed to withstand extreme mine abuse.

NEW 20- TO 100-KW VERTICAL MOTOR-GENERATOR features air-cooled design, lower excitation, reduced size, and sound-baffled construction. Self-leveling feet simplify installation. GEA-6826.



NEW VERTICAL HIGH-FREQUENCY M-G SET—150 to 500 kw—for heating and melting, features top-mounted thrust bearings to speed maintenance, extra built-in contactors for remote shut-off. GEA-6809.



NEW PACKAGED SYNCHRONOUS GENERATOR—175 to 300 kw—has static exciter-regulator for low maintenance. Easy to install. GEA-6808. 40- to 150-kw ratings feature brushless construction. GEA-6844.

BUSINESS UPTURN GIVES NEW REASONS TO . . .

Buy General Electric Motors NOW For Extra Values

With the business upturn under way, now is the time to modernize with General Electric motors to get faster delivery, better prices, and new product features.

In connection with "Operation Upturn" G.E.'s business acceleration and modernization program General Electric motors now provide over 150 specific *extra values* to help utilities, equipment manufacturers and motor and generator users throughout industry reduce costs and increase production.

Never before have values been so great. Never will there be a more favorable time for you to buy these modern General Electric motors than *right now*.

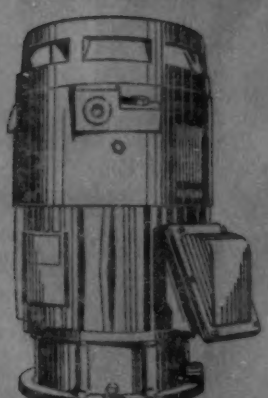
For more information on G-E extra *motor and generator* values, contact your nearby G E Apparatus Sales Office or distributor, or write for listed bulletins. General Electric Company, Schenectady, New York.

OPERATION upturn — Buy now for extra values — GENERAL ELECTRIC

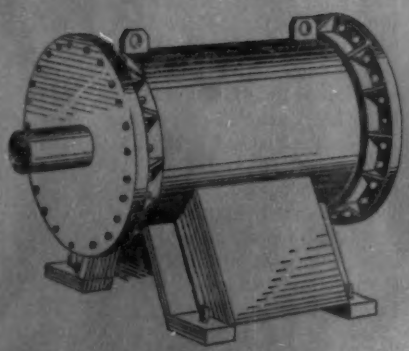
GENERAL ELECTRIC

FASTER RENEWAL PARTS SHIPMENT—for 150- to 5000-hp motors—helps cut downtime losses. Form coils have been delivered, coast to coast, in as little as 5 days. Air freight can be used if necessary.

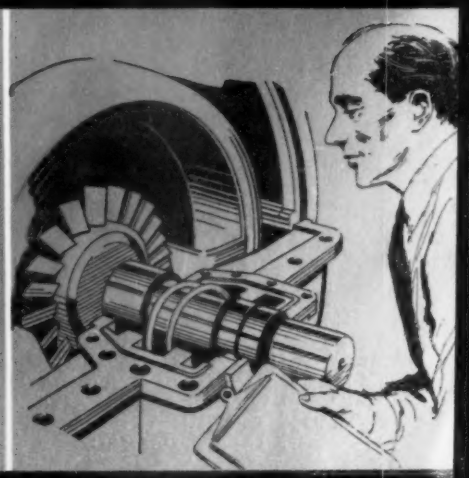
CONSOLIDATED STATOR WINDINGS—stators are flood-dipped with Glyptal® varnish to consolidate all ties and wedges as an integral part of the stator and to seal out dust, contaminants.



NEW VERTICAL TEFC MOTOR—7½ to 100 hp—provides long, dependable operation in severe weather. Available with either solid or hollow shaft. Ideal for toughest power station or industrial use.



NEW LARGE-SIZE HERMETIC MOTOR—100 to 1000 hp—offers quieter operation and minimum vibration for centrifugal air-conditioning systems. Motor is specially insulated for use in Freon.



BEARING & LUBRICATION RESEARCH—in new AC Motor Development Center—provides extra values for tomorrow's motors as well as today's. Projects include a new grease with 50% longer life.

DOUBLE TROUBLE STOPPED by CHEMPRO TEFLON*

In high speed pumps handling highly corrosive chemicals, Chempro Teflon has drastically cut pump down-time caused by scored shafts and short packing life.

"Scored" Shafts

eliminated by using CHEMPRO TEFLON SEAL CAGES†. Last many times longer than metal lantern rings under continuous corrosive attack. Snap on and off shaft quickly and easily. No vibration at high speeds. Can stand high gland pressures.

†Patented

Short Packing Life

solved by using CHEMPRO TEFLON RING PACKINGS. Give months of leak-free service compared with days and even hours for conventional packings. Require only slight gland pressure. Low coefficient of friction often makes lubrication unnecessary.

Complete information given in Bulletin CP552

*duPont Trademark

CHEMICAL & POWER PRODUCTS, Inc.

7 Broadway, New York 4, N.Y.

For more facts circle 519 on Reply Card

BACKTALK AND FORETHOUGHTS

Edited by Marjorie E. Weissman

Plant Layout Information Wanted

PLANT ENGINEERING:

"The Department of Commerce has given us the following reference and we would like to have a copy:

" 'Last Word in Plant, Equipment, etc., at Caterpillar in Joliet,' Plant Engineering, July, 1952.

"I am also looking for books or information that will show as much information as possible in an actual medium size plant, on layout, tools, equipment, machinery, production information, costs, etc., for manufacturing medium size agricultural tractors and implements." *C. D. Hicks, Camel Sales Co., Clayton, St. Louis, Mo.*

▶ PLANT ENGINEERING has published several articles on plant layout, etc., which we think will be of interest to Mr. Hicks. Copies of the articles have been sent to him.—*Editors.*

Magnetic Rolls

PLANT ENGINEERING:

"In your July, 1958, issue on page 58, you write about a rubber magnetic roll. Can you give us the address of the manufacturer?" *J. MacCrindle, Supt., American Nickeloid Co., Walnutport, Pa.*

▶ The rolls described in our July issue were on a notching press used in the manufacture of refrigerators. They are made by the Eriez Manufacturing Co., 95 Magnet Drive, Erie 6, Pa.—*Editors.*

Help With Training Program

PLANT ENGINEERING:

"A good deal of useful information published in PLANT ENGINEERING has been used throughout our plant by our engineers.

"In your June and July, 1958, editions of PLANT ENGINEERING, there have been articles presenting information that would certainly fit into our Plant Instrument Mechanic training program.

"The writer is interested in securing 24 copies each of the following: 'Instru-Mentality,' Part I and Part II, by William A. Weibel, Curtis Lighting Inc., Chicago, Ill.; and 'How To Bend Electrical Conduit' by Walter Jacoby, Maintenance Supt., I-T-E Circuit Breaker Co., Philadelphia, Pa.

"Our Instrument Mechanics will always receive training aids such as the above with appreciation and our plant endeavors to present the useful information offered in many publications such as PLANT ENGINEERING." *C. S. Browning, Instrument Engineer, The Chemstrand Corp., Decatur, Ala.*

▶ In addition to the articles mentioned above we have sent Mr. Browning several others which we think will be of interest and help in his company's Instrument Mechanic training program.—*Editors.*

Sluice Lining

PLANT ENGINEERING:

"We noted with some interest the article on page 64 of your July, 1958, issue, entitled 'Surfacer Extends Sluice Life,' showing the sluiceways at the Ford Motor Company's Rouge Plant foundry. The cross sectional sketch shown in your article is taken from a set of drawings which were made for the Ford Motor Company on our job and which cover a sluice located in the Dearborn Specialty Foundry. This sluice, designed in our office, does have a 1½-in. Emeri-Crete lining and was designed in 1951 and operating early in 1952.

"We are indeed pleased to hear that the sluice and sluice lining are still performing well after the passage of many years, as this was one of the first sluices where we used this material.

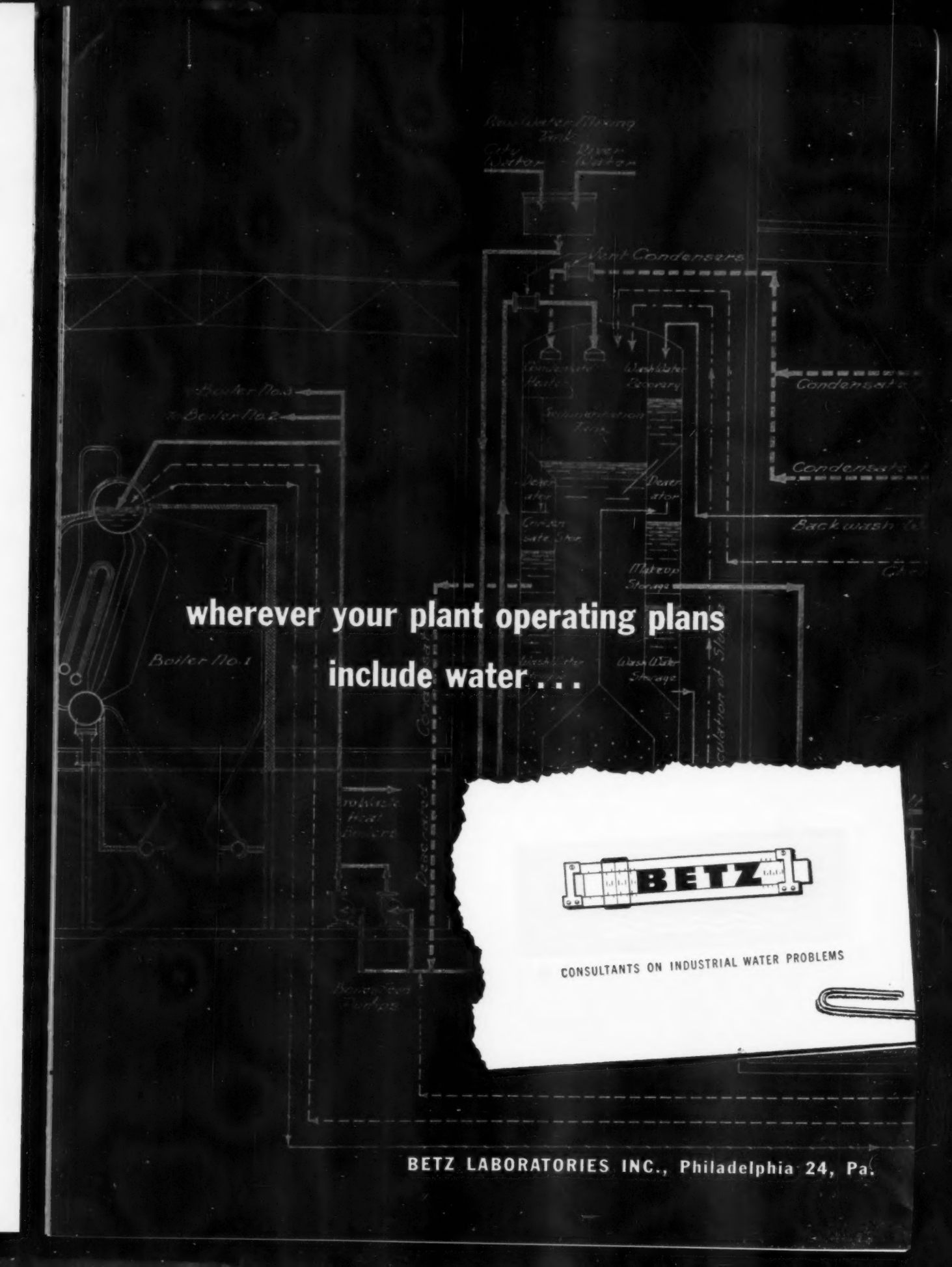
"The Ford sluice you describe was interesting in another way in that in the course of this design, the writer developed an analytical means for calculating jet-actuated sluice velocity, which enabled us to put this one in successful operation with no field modification to jet size or location." *A. J. Dempsey, Assist. Chief Mech. Engineer, Giffels and Rossetti, Architects and Engineers, Detroit, Mich.*

Permission To Reprint Article

PLANT ENGINEERING:

"We would very much appreciate your sending us reprints of the article 'Design Data on Machine Foundations' by F. John Eggert, which appeared on pages 111 through 114 of the November, 1957 issue of your magazine.

"We sincerely hope these reprints


Plant Condensers
Condensate
Condensate
Back wash
Boiler No.1
Boiler No.2
wherever your plant operating plans
include water . . .
BETZ
CONSULTANTS ON INDUSTRIAL WATER PROBLEMS
BETZ LABORATORIES INC., Philadelphia 24, Pa.

CM — mark of quality chain.

it's
BRANDED
for lifetime identification

it's SAFER
because you can be sure of its grade (strength)

BBB — grade of coil chain made from low carbon steel.

HOW IT'S DONE — The mark is embossed onto, not stamped into, the link.

NO MORE GUESSING about chain. Now you can be sure of the make and grade (strength) of the chain you use . . . a definite safety advantage. CM chain, always tops for quality, now brings you this added feature at no added cost . . . chain that is *clearly* and *permanently* identified.

Permanent marking is presently available on CM Proof Coil, BBB, High Test and Herc-Alloy chain in all sizes under ½".

SPECIFY CM INSWELL FOR THIS NEW FEATURE

CM CHAIN

COLUMBUS McKINNON CHAIN CORPORATION
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In Canada: McKinnon Columbus Chain Limited, St. Catharines, Ontario

CM® INSWELL® HERC-ALLOY® PAT. APP. FOR BRANDED CHAIN

For more facts circle 521 on Reply Card

BACKTALK — FORETHOUGHTS

are available and ask that you address them to the attention of the writer, to insure prompt arrival at this department." *John S. Jarecki, Chief Engineer, Vulcan Iron Works, Wilkes-Barre, Pa.*

▶ Unfortunately our supply of tear sheets is exhausted and no reprints of the article are available. However, we are glad to give our permission to reproduce it locally, giving credit to PLANT ENGINEERING.—*Editors.*

All About Selenium Rectifiers

PLANT ENGINEERING:

"I am interested in the article in the March, 1958 issue on page 94 through 100 titled 'Primer on Rectifiers' by Tom White and would like to know if it is possible for me to have six to 12 reprints of this fine article. We are in the process of surveying our plant for selenium rectifiers." *Herbert H. Price, Chief Engineer, Sheraton-Palace, San Francisco, Calif.*

▶ Reprints of this article which deals with circuits, applications, troubleshooting and maintenance of selenium rectifiers, are available at 10 cents each.—*Editors.*

Machine Repair Series

PLANT ENGINEERING:

"Reading a back issue of PLANT ENGINEERING, we came across an article regarding 'Cold Metal Machine Repair,' written by R. L. Rectenwald of Maintenance Engineering Corp., Pittsburgh, Pa.

"As we are unable to locate the issues with the other two installments, we would appreciate tear sheets of the complete series, if available. Please bill us for any charges or send material C.O.D." *L. J. Morton, Business Manager, Superior Welding & Press Repair Co., Detroit, Mich.*

▶ The series of three articles appeared in the summer and fall of 1957. We have sent a complete set to Mr. Morton with our compliments.—*Editors.*

Fighting Abrasion

PLANT ENGINEERING:

"We would like to have a copy of the article in your July, 1958, issue titled 'Do You Have Abrasion Problems?' We noted in your magazine that this was the second of two articles on this problem. If there are reprints available of both of the articles we would be pleased to receive a copy of each." *Joe A. Walsh, Sales Manager, R-J Bearings Corp., St. Louis, Mo.*

▶ This article appeared in two parts, in our June and July, 1958, issues, respectively, and dealt with the use of ceramic materials in fighting abrasion problems. Tear sheets are available.—*Editors.*

Reprint for Education Program

PLANT ENGINEERING:

"I read the article which appeared in the February, 1956, PLANT ENGINEERING magazine entitled 'Corning Engineers Check on Selves' and I found it very informative and useful in our field of endeavor.

"I would appreciate receiving your permission to reproduce this article for internal use, for educational and training purposes only." *B. J. Mandel, Chief, Statistics Branch, Dept. of Health, Education and Welfare, Social Security Administration, Baltimore, Md.*

Lift Truck Maintenance Costs

PLANT ENGINEERING:

"Again I find myself asking for your help on a project of mine.

"We are currently trying to evaluate the merits of electric lift trucks as compared to the propane type. As you would suspect, the problem of maintenance of each must be completely explored. I would appreciate it very much if you could furnish me with reprints of any articles you have published regarding this area of operation for each.

"I am very grateful for the opportunity to use your files as a central reference source. The information you have furnished me in the past has been of great help and I will continue to use your facilities whenever possible. Many thanks." *H. O. Loewer, Chief Engineer, Moore Business Forms, Incorporated, Niagara Falls, N. Y.*

▶ We are always glad to know that our readers are not hesitant about requesting tear sheets and other information we have available. We have sent Mr. Loewer several articles which we think will be of assistance, but would like to suggest that readers who have information on the comparative costs of operating and maintaining electric and LP gas trucks, write direct to him at the above address.—*Editors.*

PERMATEX

JUST NAME IT!

PERMATEX CAN HELP YOU SEAL IT!

No liquid or chemical is too special for the most famous name in sealants.

The regular lines of Permatex sealants, like the many types of Form-A-Gasket, are staples . . . standard leak-insurance in thousands of plants. But many companies have asked us to meet special and specific needs. The products shown here are the result of laboratory cooperation with industry. The same service is available to any plant with a sealant problem. Your investment in maintenance time and labor is valuable . . . finish the job right with the best . . . by Permatex.

SEALANT 1282: for "hard to hold" chemicals. Insoluble in most chemicals used in industry today. Specially resistant to non-flammable hydraulic fluids. Excellent for use on all types of industrial refrigerants. Brushable black paste, soluble in water, that sets hard. Minus 50° F. to plus 600° F.

SEALANT 1372: high temperature resistance. Used by leading aviation heating equipment manufacturers to seal heating ducts, because it does not produce offensive odors at high temperatures and is vibration resistant. Diester resistant. Black paste, soluble in alcohol, that sets semi-rigid. Minus 50° F. to plus 650° F.

SEALANT 1505: white, can be key-colored. Resistant to aliphatic hydrocarbons such as gasoline, hexane, pentane, etc.; aromatic hydrocarbons such as benzene, toluene, etc. Soluble in alcohol. Minus 60° F. to plus 375° F. A brushable liquid form (Sealant 1520) is available.

SEALANT 1516: oxygen resistant. Formulated specially for oxygen assemblies. Meets all safety requirements for threaded, flat or flanged assemblies. Paste remains pliable. Good vibration resistance. Soluble in perchlorethylene. Minus 65° F. to plus 200° F.

SEALANT 1519: acid, alkali resistant. Resists hot or cold acid, alkali and salt solutions, as well as lower molecular weight alcohols and glycols. Black brushable paste, soluble in toluene, that dries to pliable film. Minus 50° F. to plus 230° F.

SEALANT 572: hydrocarbon resistant. Conforms to MIL-S-7916B. Exceptionally resistant to vibration. Highly recommended for aromatic fuels and lubricants in aviation industry. Tan, brushable viscous liquid that sets slowly, forming a flexible plastic film. Minus 65° F. to 400° F.

. . . plus complete lines of job tailored products to keep your equipment producing faster, more safely, with less downtime.

All these Permatex products are readily available at recognized quality industrial distributors.

PERMATEX

PERMATEX

COMPANY, INCORPORATED

300 Broadway, Huntington Station, L. I., New York

Factories: Brooklyn, N. Y. • Kansas City, Kansas

"There's a Permatex product for every maintenance need"

SEALANTS • ADHESIVES • LUBRICANTS

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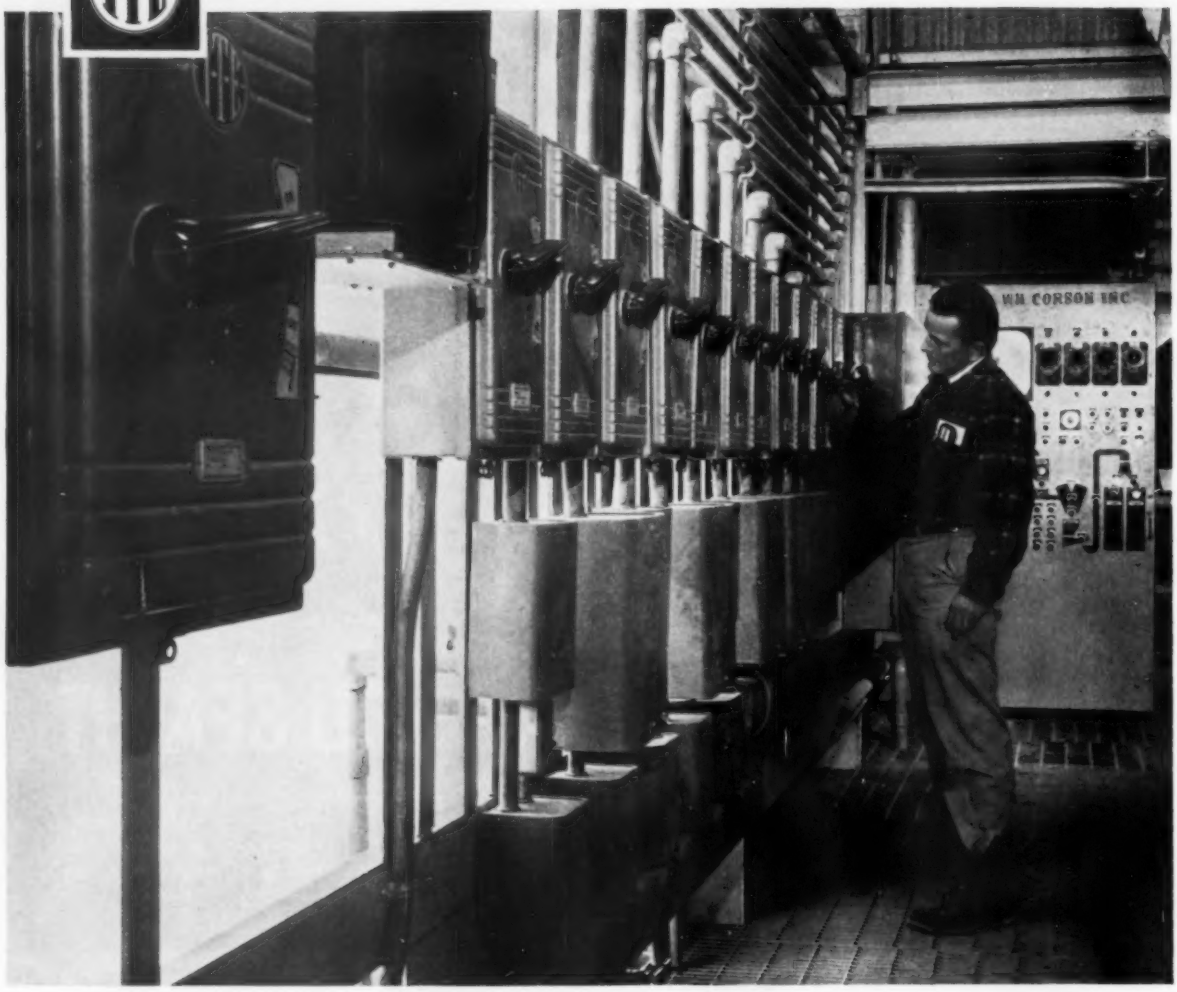
MOLDED CASE CIRCUIT BREAKERS



"Our new automated masonry cement plant is protected against costly shutdowns with I-T-E circuit breakers"

"Since momentary motor overloads can occur in our particular installation, we chose circuit breakers to eliminate the possibility of costly and unwarranted outages," says John R. Allen, designer and project engineer for G. & W. H. Corson's unique new masonry cement plant. "Circuit breakers do, of course, provide complete protection for our motors against actual faults, including protection against single phasing." The Corson Company, America's oldest lime manufacturer, and held in high regard by engineers for its many developments in the lime industry, appreciates the products and services which I-T-E provides. We think you will too, and, like all who choose I-T-E Molded Case Circuit Breakers, you will appreciate the "extra quality—*at no extra cost*" which is built into all I-T-E products. Contact your local I-T-E Distributor, or write I-T-E Circuit Breaker Co., Small Air Circuit Breaker Division, 19th & Hamilton Sts., Phila. 30, Pa. In Canada: Eastern Power Devices Ltd., Port Credit, Ont.

I-T-E CIRCUIT BREAKER COMPANY

PHILADELPHIA, PENNSYLVANIA

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For more facts circle 524 on Reply Card→

NEW GULF METALCOAT A

protects against rust and corrosion up to 10 times longer

9 years of intensive test exposure prove that new

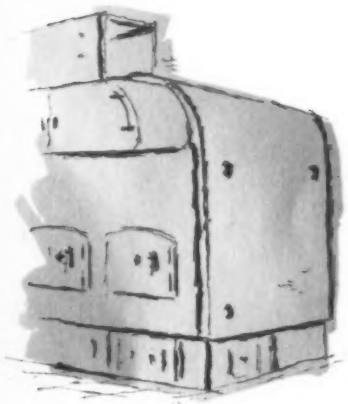
GULF METALCOAT A

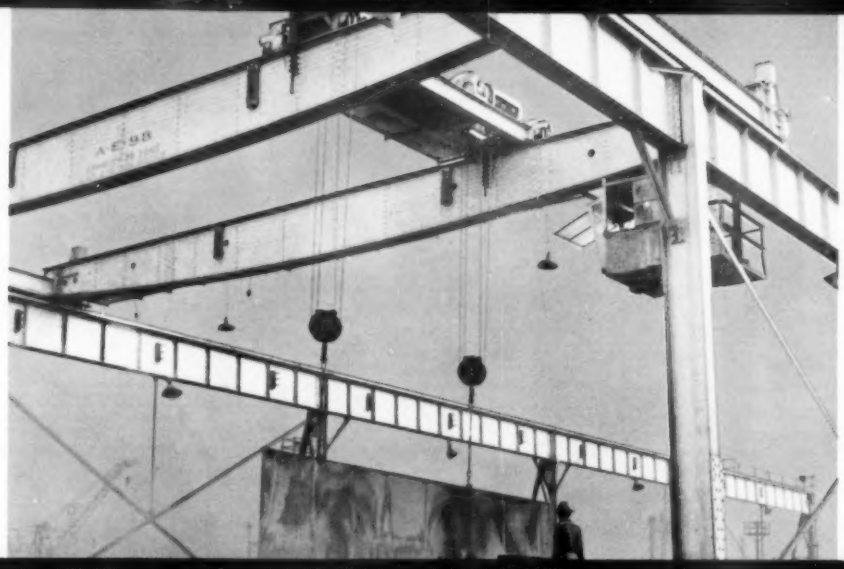
- **protects metal surfaces against rust and corrosion up to 10 times longer**
- **protects under the most severe exposures in industrial and marine atmospheres**
- **is easy to apply by brushing, spraying or dipping— to either smooth or rough surfaces**
- **is unaffected by temperature changes**
- **resists the abrasion of normal handling—yet can be easily removed by a petroleum solvent**
- **costs less**

New Gulf Metalcoat A is a revolutionary new aluminum pigmented liquid coating that has been passing the most rugged marine and industrial tests for 9 years! Salt spray tests at Wrightsville Beach, N. C., revealed that Gulf Metalcoat A gives from 7 to 10 times greater protection than that afforded by competitive products. In a Philadelphia shipyard, overhead cranes have been perfectly protected by Gulf Metalcoat A for 4 years. Ships have used the new coating on stacks and other exterior surfaces exposed to salt spray atmosphere—with outstanding success.

For long-lasting protection, use new Gulf Metalcoat A on piping, fences, storage tanks, sheet metal buildings, metal roofs, machine parts, land transportation equipment, ships, barges, stacks and other marine applications.

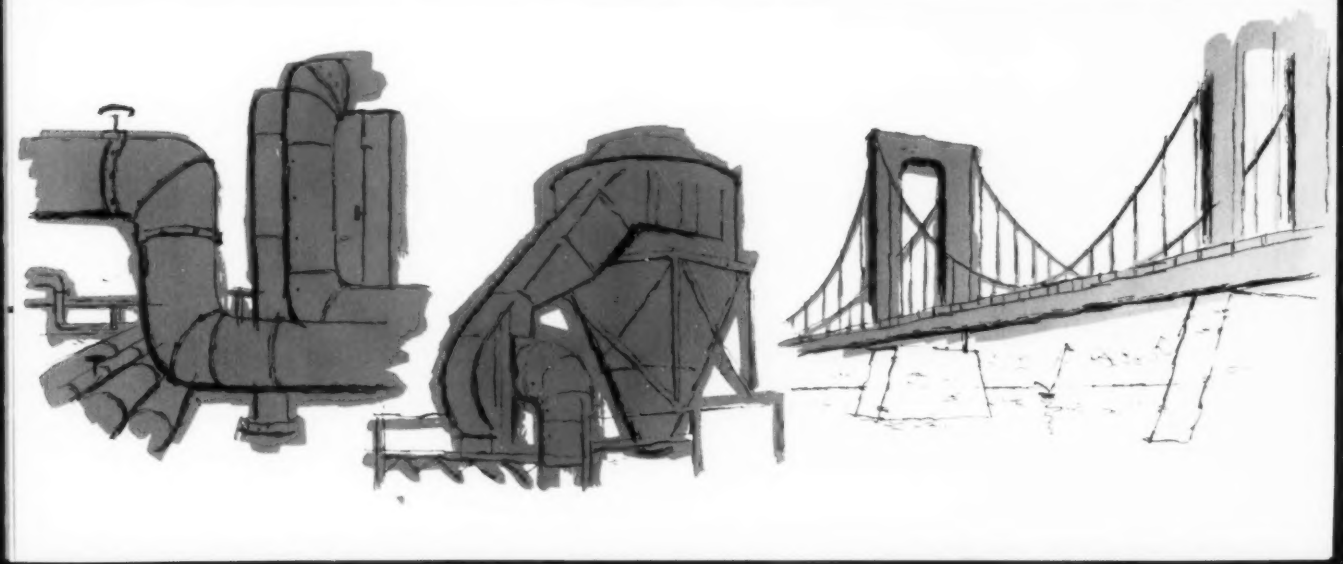
For temporary protection during storage or shipment, Gulf Metalcoat A is excellent for structurals and steel components of all kinds.

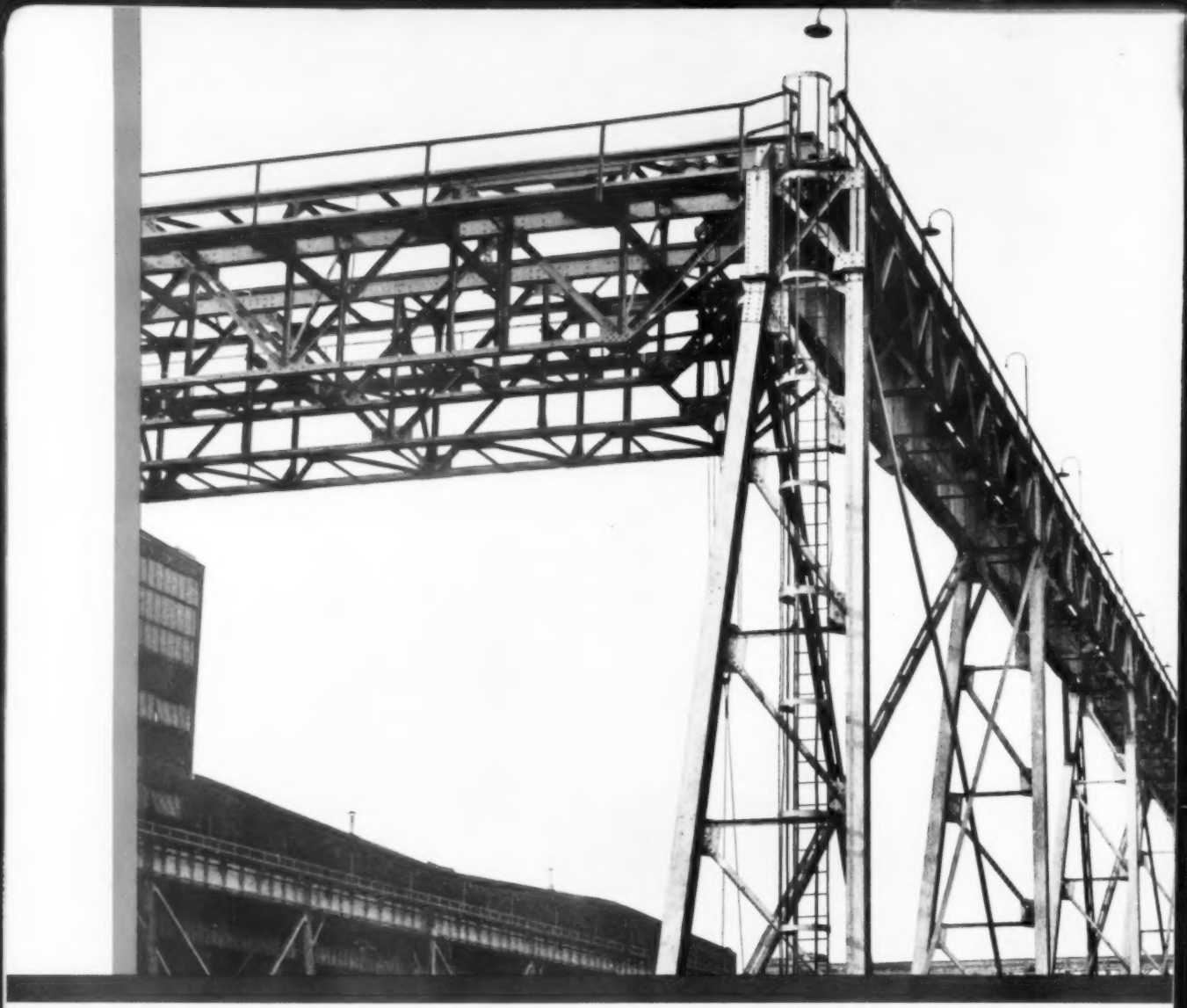




Gulf Metalcoat A has protected this steelwork for 4 years—above sulfuric acid pickling tanks! Coating is still in excellent condition.

These building exhaust ventilators, located in a corrosive atmosphere, are kept free from rust and corrosion by Gulf Metalcoat A.





After 2 years' exposure, Gulf Metalcoat A is still giving exceptional protection to the structural steelwork supporting this 40-ton overhead traveling crane.

GULF METALCOAT A is available now

Gulf Metalcoat A is now available through your Gulf Sales representative. For more information, call your nearest Gulf office, or mail the coupon.

GULF OIL CORPORATION
Dept. DM, Gulf Building
Pittsburgh 30, Pa.

Please send me price information on new Gulf Metalcoat A.

Name_____

Title_____

Company_____

Address_____

City_____ Zone____ State_____

SP 9324

GULF OIL CORPORATION
Dept. DM, Gulf Building
Pittsburgh 30, Pa.

GULF

Here's Quick, Permanent Solution To Many Plant Construction Problems:

ARMCO CORRUGATED METAL STRUCTURES

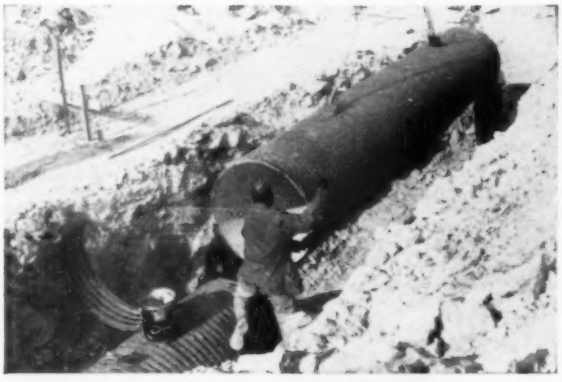
Meeting the basic need of underground structures for plant operations can have many answers. But for fast construction, dollar savings, permanence and a minimum of maintenance, you'll find Armco Corrugated Metal Structures provide the *best* answer. Look how you can use them.

UNDERPASSES

Big, sturdy Armco MULTI-PLATE® Structures, available in a variety of sizes, shapes and gages, are an economical tool for the design and construction of underpasses and similar structures where you need clearance for trucks and other big vehicles. Many serve as grade separations between plant traffic and public or private thoroughfares.

UTILITY AND PEDESTRIAN TUNNELS

Tunneling is often the best answer for installing conduits, pedestrian underpasses and similar structures under existing facilities. When you tunnel, you save the surface. When you tunnel, do it quickly and safely with Armco Liner Plate. Pound for pound, it's the strongest tunnel liner plate made.



SEWERS AND CONDUITS

For sewers, conduits, culverts—practically any drainage need—specify Armco Pipe to meet your exact requirements, from size to service conditions. Long lengths help speed installation, keep costs down.

For complete information, write us, outlining your drainage or construction problem. Ask for free, helpful literature on Armco Corrugated Metal Structures. Armco Drainage & Metal Products, Inc., 5068 Curtis Street, Middletown, Ohio. Subsidiary of Armco Steel Corporation. In Canada: write Guelph, Ontario. Export: The Armco International Corporation.

ARMCO®

For more facts circle 525 on Reply Card

PLANT ENGINEERS' DIGEST —so those who rush may read and know what's new

Edited by Marjorie E. Weissman

Synthetic Planks

LIGHTWEIGHT inorganic planks and panels have been developed and are being produced on a pilot plant scale by our ceramics division. The new material, which has many of the desirable properties of wood, is produced by casting a mixture of Portland cement and other inorganic materials in molds and steam-curing it.

It has about the same density as wood, weighing 35 lb per cu ft and can be sawed, nailed or glued. Conventional wood working tools can be used to work the material which possesses good flexibility.

Nails can be driven into lightweight, molded, inorganic wood substitute.

It is fireproof, rotproof and does not expand in humid atmospheres.

The fact that the material is cast in molds may eliminate some of the hand finishing that wood demands. The original research program called for a substitute for wood blocks used to mount photoengraving plates. *From Battelle News, published by Battelle Memorial Institute, Columbus, Ohio.*

Modified Lift Truck Solves Parts Storage Problem

PROBLEM OF STORING and picking up small parts and sub-assemblies in a warehouse was solved by the Crocker Wheeler plant of Elliot

(Continued on page 40)

Hot Batteries Are Cooled Off and Recharged on Ventilating Bench

DURING PEAK work loads at the Liebmann Breweries, Brooklyn, N. Y., battery electrolyte temperatures have risen as high as 135 F as a result of high ambient temperatures during warm weather.

To combat this condition, a forced-draft ventilating bench is used for charging truck batteries. Built by maintenance personnel, it cost about $60 per battery rack.

With framework constructed of angle iron stock, the bench measures approximately 36 ft long by 3 ft wide by 15½ in. high. It is divided into 12 equal compartments each measuring 25 in. by 31 in., and accommodating one 20-cell storage battery assembled in a steel, demountable box. The sides and bottom of each compartment are made of wood planking to form an enclosure.

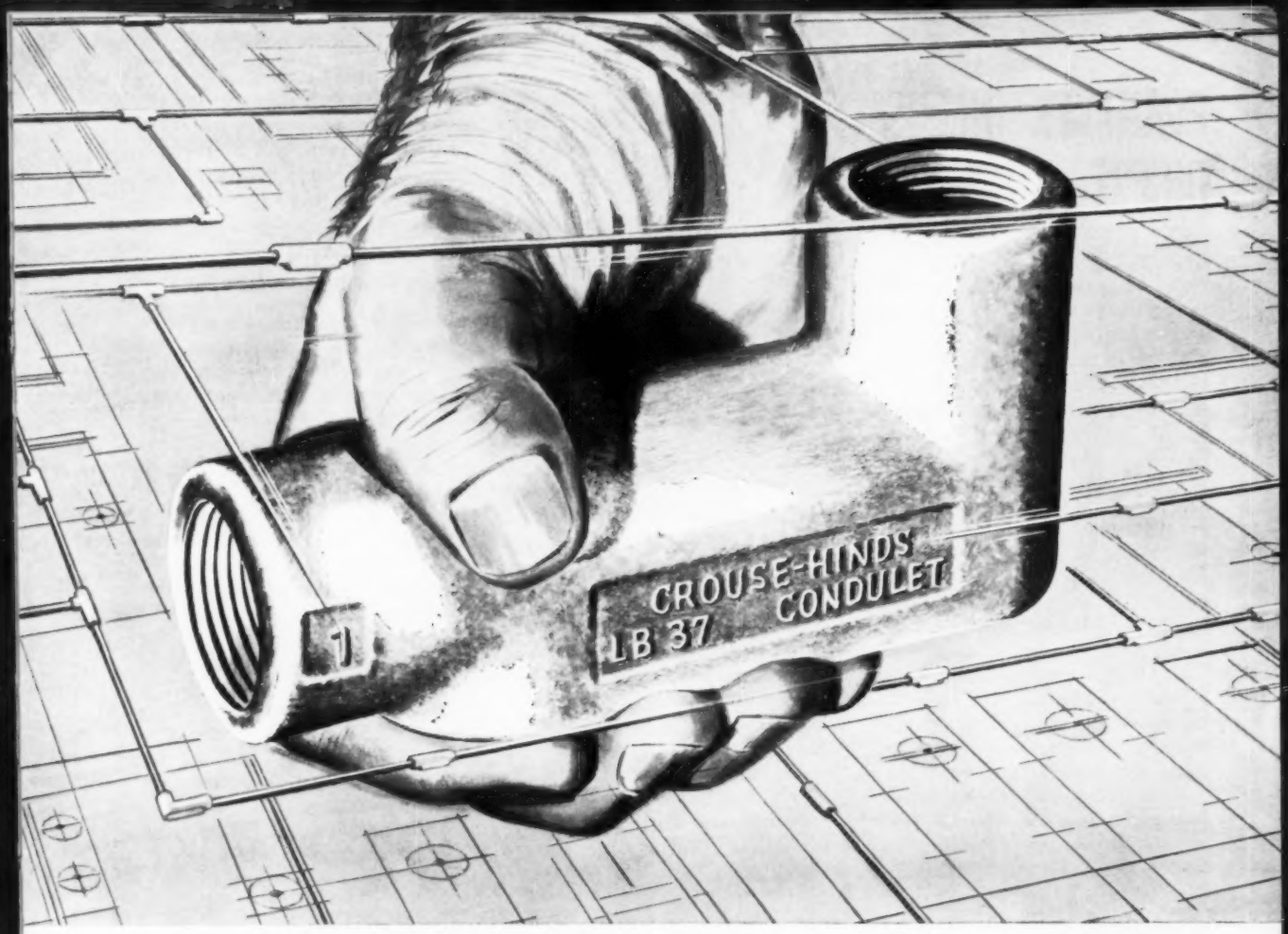
At the bottom of each compartment, a circular hole was cut to accommodate a 10-in., four blade fan powered by a 1/30-hp a-c motor. When in operation, the fan forces air into the enclosed compartment and between the cells of the battery which has hinged covers to facilitate ventilation.

At the top of each battery station on the cooling bench is a switch, so installed that the actuating lever is above the upper edge of the compartment.

When a battery is lowered into position, it depresses the switch before coming to rest over the ventilating unit. This starts the fan and guards against placing a battery on the bench without turning on the fan. *From Storage Battery Power, published by Storage Battery Div., Thomas A. Edison Industries, West Orange, New Jersey.*

Ventilated bench holds 12 batteries, has speeded charging.

Switch starts fan when battery is lowered into position.



For qualities beyond your specifications —

CONDULETS*...

made only by Crouse-Hinds

You'll find Condulet electrical equipment in two out of three plants across the country. It's there because electrical engineers have discovered that it provides *more* than standard performance.

And no wonder. Only Condulet rigid conduit fittings have all these features:

✓The wedge-nut cover fastener.

✓Longer hubs for a better wrench grip.

✓Taper tapping to match ASA standard tapered conduit threading for a rigid joint that will not loosen.

✓A triple long-lasting finish that exceeds Federal government and U.L. specifications.

✓A smooth, integral bushing to protect cable insulation.

✓Feraloy, a special alloy that is strong, resists corrosion, and gives full, sharp threads.

For installations where aluminum, plastic or plastic-coated conduit is used, we can supply either copper-free aluminum or plastic-coated Condulet fittings as required.

• *Next time you order, specify Condulet equipment. From the simplest fitting to complex motor controls, the name "Condulet" and the Crouse-Hinds trade-mark are your assurance of receiving the finest.*

CROUSE HINDS

MAIN OFFICE AND FACTORY: SYRACUSE, NEW YORK

Crouse-Hinds Company of Canada, Ltd., Toronto, Ont.

• CONDULET® ELECTRICAL EQUIPMENT (Explosion-Proof and Conventional) • FLOODLIGHTING
• TRAFFIC CONTROL SYSTEMS • AIRPORT LIGHTING and WEATHER MEASURING EQUIPMENT

These products are sold exclusively through electrical distributors. For application engineering help, contact one of the following offices: Baton Rouge Birmingham Boston Buffalo Chicago Cincinnati Cleveland Corpus Christi Dallas Denver Detroit Houston Indianapolis Kansas City Los Angeles Milwaukee New Orleans New York Omaha Philadelphia Pittsburgh Portland, Ore. Salt Lake City St. Louis St. Paul San Francisco Seattle Tulsa Washington **Resident Representatives:** Albany Atlanta Baltimore Charlotte Chattanooga Jacksonville Reading, Pa. Richmond, Va. Shreveport

* CONDULET is a coined word registered in the U.S. Patent Office. It designates a brand of products made only by the Crouse-Hinds Company.

For more facts circle 526 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 38)

Co., Jeannette, Pa., by using a specially adapted walkie type, outrigger high-lift truck.

Other procedures such as using mobile ladders and conventional fork trucks handling palletized loads had been tried and discarded.

The truck can be driven and steered from the forks, and complete control is provided from the load platform so that the operator may drive the truck to the proper position then elevate himself and the load to the correct height.

A special platform with a safety rail to protect the operator is placed on the truck's forks. Steering wheel, lift and travel controls are mounted on the elevator carriage and move up and down with the load. Remote control of steering was solved by the use of a square, telescoping steering rod nested alongside the uprights.

Electric motors are moved to storage by operator who rides with the load.

As parts are needed, the operator rides along the aisles, picking the required parts, which have been placed on skids or in boxes, from the storage shelves. The truck is also used in the finished motor storage area. Motors secured on expendable skids are raised to position and pushed off the loading platform into live storage racks.

During the year that the truck has been in operation, it has required no maintenance, although during peak periods it is operated constantly. *From a release of The Moto-Truc Co., Cleveland, Ohio.*

Prevent Corrosion in Standby Boilers

WHEN BOILERS are taken out of service for any length of time, corrosion may occur on internal surfaces unless precautions are taken.

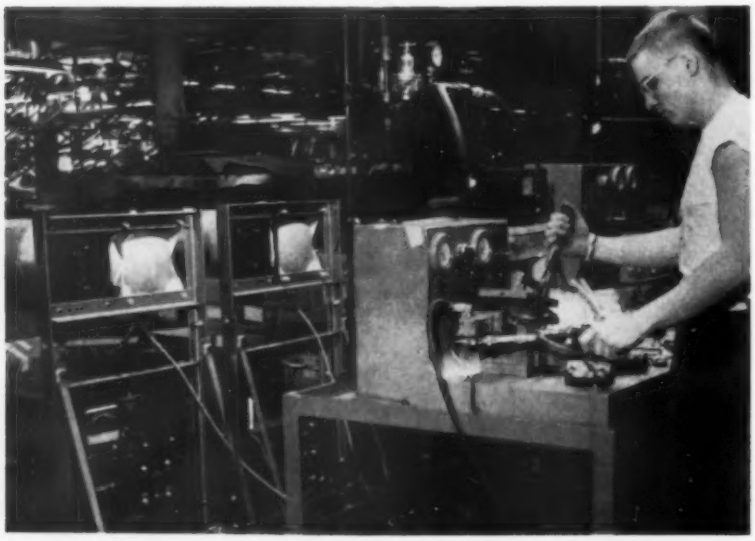
When a boiler is to be out of service for a month or more, it should be drained, thoroughly cleaned, inspected and dried internally by hot air stoves or a light wood fire. About 30 lb of quick lime for each 100 boiler hp should be spread on watertight, wood trays in the boiler immediately after the drying process.

If the boiler is an HRT or locomotive type, a single tray resting on top of the flutes or in the bottom of the shell will be adequate. In the multi-drum watertube boiler, a tray should be placed in each drum. Afterwards, manheads, handholes and all connections should be tightly blanked.

(Continued on page 42)

Infrared Leak Detector Checks Automobile Air Suspension Assemblies

AUTOMOBILE manufacturers are using an infrared leak detector to test air suspension systems on their products. To insure air tightness, the system must pass through a rigorous quality control procedure. To test for possible leakage, a number of normally acceptable methods were tried but were found unsatisfactory. The infrared leak detector, using a nitrous oxide gas tracer, has proved acceptable. The detector is almost insensitive to stray gases and atmospheric contaminants present in the plant.



Leak detectors, left, using nitrous oxide gas, are used to check components of air suspension system before assembly. Whole system is checked afterwards.

This method of locating leaks involves the introduction of nitrous oxide into a closed system and the detection of its presence as the gas escapes from the system. The detection equipment shows, within three seconds, nitrous oxide concentrations as small as 1 ppm of normal air. By moving a probe over the nitrous oxide pressurized system, the operator is given both visible and audible indication of a leak. Variations in loudspeaker pitch and meter reading, lead to the location of the leak point. *From a release of Perkin-Elmer Corp., Norwalk, Conn.*

This sludge-clogged hydraulic line . . . looked like this, after cleaning with a Sunvis 700 oil.

With Sunvis 700 oils, you can clean hydraulic systems and keep them clean

Sludge, caused by high temperatures, and by water, dirt, cutting oils, paint, packing, and by many other contaminants, clogs lines and cuts efficiency.

Sunvis* 700 oils keep these contaminants in suspension, and carry them away to the filters, thereby keeping systems clean and preventing costly shutdowns. In fact, many seriously fouled systems can be cleaned and kept clean permanently by a switch to Sunvis 700 oil. A single charge of Sunvis 700 oil can keep even a continuously contaminated system running smoothly for months, often *years*.

Your Sun man knows Sunvis 700 oils inside out. He has facts, figures, and case histories that prove their quality... quality that means *money in your pocket*. Call him in soon. Or write to Dept. PY-9.

Industrial Products Department

SUN OIL COMPANY, Phila. 3, Pa.

SUNOCO

*TRADEMARK

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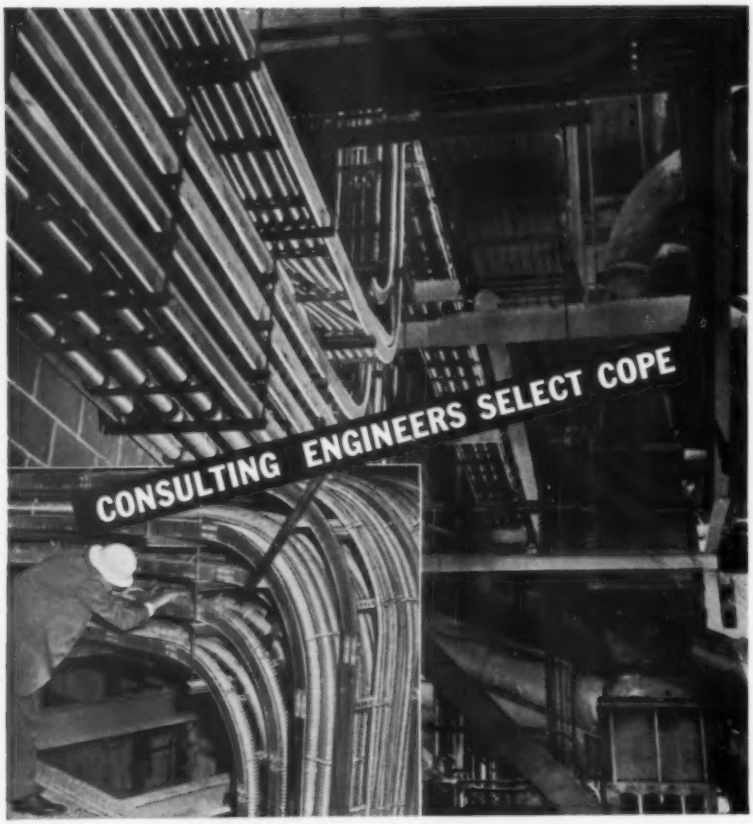


"MILES OF SAVINGS" RIDE ON COPE CABLE LADDER

Over two miles of Cope aluminum cable ladder support countless miles of aluminum interlocked armored cable at the first unit of Metropolitan Edison Company's new Portland generating station, currently rated at 165,000 KW. Ultimate capacity is expected to be approximately 1,000,000 KW. Selection of Cope cable ladder by Gilbert Associates, Inc., consulting engineers, permitted necessary system flexibility and ease of installation . . . at cost savings and quality not possible with other available methods and materials!

ASK FOR PROOF FROM COPE

Other manufacturers **can only talk about** your system requirements—Cope is prepared to **prove** Cope system performance with accurate technical data, load deflection tables, actual heating tests, etc. Whenever you ask about cable supporting equipment **ask for proof!** Cope has it.

System Layout No Problem

Cope cable ladder combines main stringers of "Z" section aluminum with slotted rungs at specified intervals for securing of cables. Strong, yet lightweight, it is easy to handle, easy to install—even in the most cramped quarters. Cope's *complete* line of fittings and accessories permit required changes in direction, elevation or other conditions of system layout. Cope's pin-type coupler joins ladder straight section and/or fittings in seconds . . . permits easy connection to other Cope systems . . . expanded metal wireway (trough) and cable channel. Every Cope system is **complete** . . . no hardware or other extras to buy later.

Cuts Costs Three Ways

A single run of Cope ladder or wireway supports as many cables as several runs of conduit. From the start, you save in materials and labor costs . . . keep space requirements to a minimum! An easy-to-get-at Cope system cuts maintenance costs, too . . . permits ready re-routing of existing cables or adding of new cables in the future. All Cope cable supporting equipment is available in aluminum or hot dip galvanized steel construction.

Contact your authorized Cope distributor . . . or write to T. J. Cope Division, Rome Cable Corporation, Collegeville, Pa.

1004

T. J. COPE *Division*
ROME CABLE CORPORATION

For more facts circle 528 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 38)

If the boiler is idle for a considerable time, it should be examined every three to four months. Silica gel can be used instead of quick lime, allowing 4 lb for 100 cu ft air space.

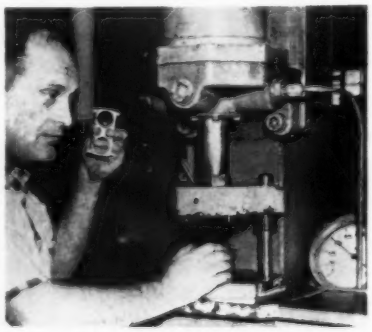
If a boiler must be left idle with water in it, for emergency service, for more than a week, it should be thoroughly cleaned and inspected. After it is filled to normal water level, the water should be boiled with the boiler properly vented to the atmosphere for a short period.

The water should then be made alkaline in excess of 400 ppm by adding approximately 3 lb caustic soda per 1000 gal of water. In addition, sufficient sodium sulfite should be added to produce a minimum residual sulfite content of 100 ppm. This will require approximately 1½ lb sodium sulfite per 1000 gal boiler water.

After the boiler has cooled, but before a vacuum has been created, it should be filled completely and all connections closed. Water should be tested at weekly intervals for alkalinity and sulfite concentration. Since corrosion is prompted by lukewarm water, boiler water should be kept as cool as possible. *From The Condenser, published by Mutual Boiler and Machinery Insurance Co., Waltham, Mass.*

Cobalt Alloy for Balances

By using a high cobalt base alloy for the torsion bands of precision balances, Torsion Balance



Technician holds master truss as he "tunes" another truss in the press.

For more facts circle 529 on Reply Card ⟶

WRIGHT HOISTS & CRANES

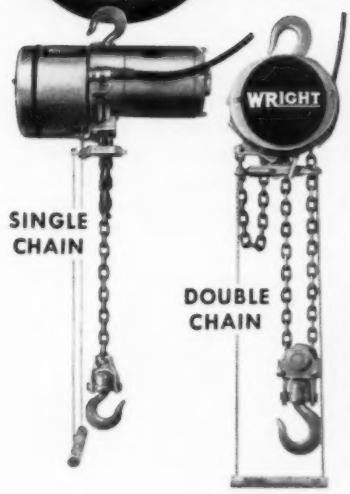
FOR LONGER LIFE • EASIER MAINTENANCE
LOWEST FINAL COST

ACCO

NEW...

WRIGHT Electric Chain Hoists

LIGHT - COMPACT - RUGGED - LOW COST



Two capacity ranges as pictured—
Single Chain 300 to 2000 lbs. Double Chain 3000 to 4000 lbs.

• Long Life—Safety—Minimum Maintenance are assured by these sound features: Wick Oiling of Load Chain gives a working life many times greater than dry chain...Fewest Moving Parts of any chain-type electric hoist cuts maintenance...Alloy Steel Load Chain is heat-treated for long-wearing surface, with ductile core to resist shock loads—side-pull won't break this flexible chain...Load Wheel, Hooks and Hook Couplings are drop-forged alloy steel...Precision Ball Bearings, and gears operating in oil bath, increase efficiency and lengthen life...Double Braking gives maximum Safety. Worm and Gear Drives serve as simple, positive Load Brake, and there's a big, efficient Motor Brake, easy to adjust for lining wear. For complete information, write York, Pa., for **Bulletin DH-73.**

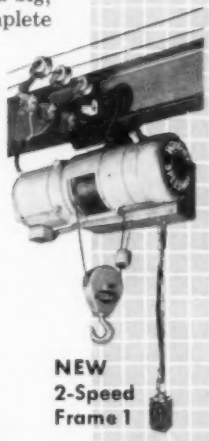
WRIGHT *SPEEDWAYS*—Capacities ¼-ton to 10 tons

FRAME 1, FRAME 1½, FRAME 2, FRAME 3

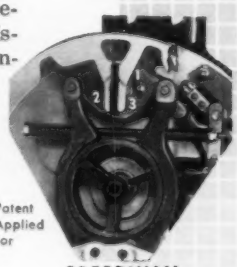
• The New 2-Speed Frame 1 WRIGHT *Speedway* pictured here has a 2-speed motor... 1800 RPM for fast lifting and lowering...450 RPM for slow, gentle positioning on production work. It's ideal for foundries and machine shops. Capacities ¼-ton to 1 ton.

• WRIGHT *Speedway* features make them your best buy for production work: The Motor Brake pictured here is an outstanding feature of WRIGHT *Speedways*. It's foolproof! No adjustment for springs or solenoid ...*Nothing to Adjust but the Cam!*

Other WRIGHT *Speedway* features: Perfect balance for smooth running...NEMA 30-minute motors for heavy-duty work...best available electric controls...heat-treated alloy steel gears, pinions and shafts have hard-wearing surface, ductile cores for shock resistance...splined connections minimize distortion...precision ball or roller bearings insure efficiency, low maintenance...gears and gear shaft bearings splash-lubricated in gear housing...Weston-type load brake ...all suspensions—lug, hook, base mountings or Timken trolleys.



NEW
2-Speed
Frame 1



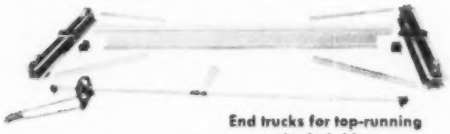
Patent Applied for

SPEEDWAY
MOTOR BRAKE
Nothing to adjust but the cam!

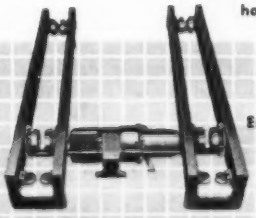
WRIGHT END TRUCKS AND CRANE DRIVE UNITS

Build Better Cranes... Save Money too!

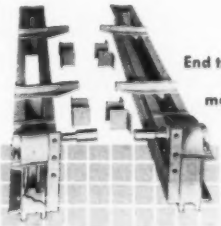
• WRIGHT Motor-Driven Cranes, Hand Traveling Cranes, End Trucks, Drive Units and Trolleys are available in a wide range of sizes and capacities to meet every overhead material-handling requirement. Write our York, Pa., office for literature and information on the equipment you need.



End trucks for top-running single-bridge hand-traveling cranes



End trucks and drive units for underhung cranes



End trucks for top-running double-bridge motor-driven cranes

Wright Hoist Division
AMERICAN CHAIN & CABLE

York, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York
Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

MARLEY
Double-Flow Aquatower®
adds profit to peanut processing

The cost of water isn't "peanuts" in any plant; especially is this true of the world's largest, most modern peanut processing plant where this Model 14 Double-Flow Aquatower does an important job of reducing operating cost. It also plays a major role in the comfort cooling system that minimizes labor turnover.

This compact, low-silhouette tower is saving more than 95% of the water required for processing and air conditioning. The Double-Flow Aquatower was selected for its proven ability to provide specified performance—with maximum economy and dependability, with minimum upkeep and attention. Such exclusive features as convenient access, at-a-glance inspection, and dependable Marley designed and manufactured mechanical equipment make these towers functionally simple, so no technical skill is required for long-life, efficient operation.

In plants of all types, standard Double-Flow Aquatowers are being selected to handle special cooling problems, for they are available in a wide range of intermediate-capacity sizes, in single or multi-cell arrangements. If your cooling requirements call for operational flexibility, absolute dependability and maximum economy—all in a limited plant area—write today for bulletin DFA-58. Or, ask your local Marley representative to take you on the "Double-Flow Aquatower Tour" in your area — they are everywhere.

Marley equipment and components covered by U. S. and Foreign Patents and Patents Pending

MARLEY

The Marley Company

Kansas City, Missouri

For more facts circle 530 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 38)

Co., Clifton, N. J., has eliminated a production operation and improved the service life of the balances.

Because the bands control sensitivity of the balance, they must maintain uniform tensile strength. When assembled on the trusses, the bands are uniformly stressed in a hydraulic press to approximately 100,000 psi by sound "tuning" against the 100,000 psi tone of a master truss.

Formerly bands were made of high carbon steel and spray painted after assembly to afford protection from corrosion. Prestressing a steel band brought it closer to its yield strength, reducing its ability to resist fatigue. The cobalt base alloy bands do not need to be painted and have high tensile strength. *From a release of Athenia Steel Co., Div. of National Standard Co., Clifton, N.J.*

New Cure for Plastic Patches

Standard glass radiant heat unit mounted on counterbalanced arm cures plastic patches on jet tanker radome. Variable voltage regulator permits adjustable temperature range. (From a release of Boeing Airplane Co., Seattle, Wash.)

Tanks Lifted by Vacuum

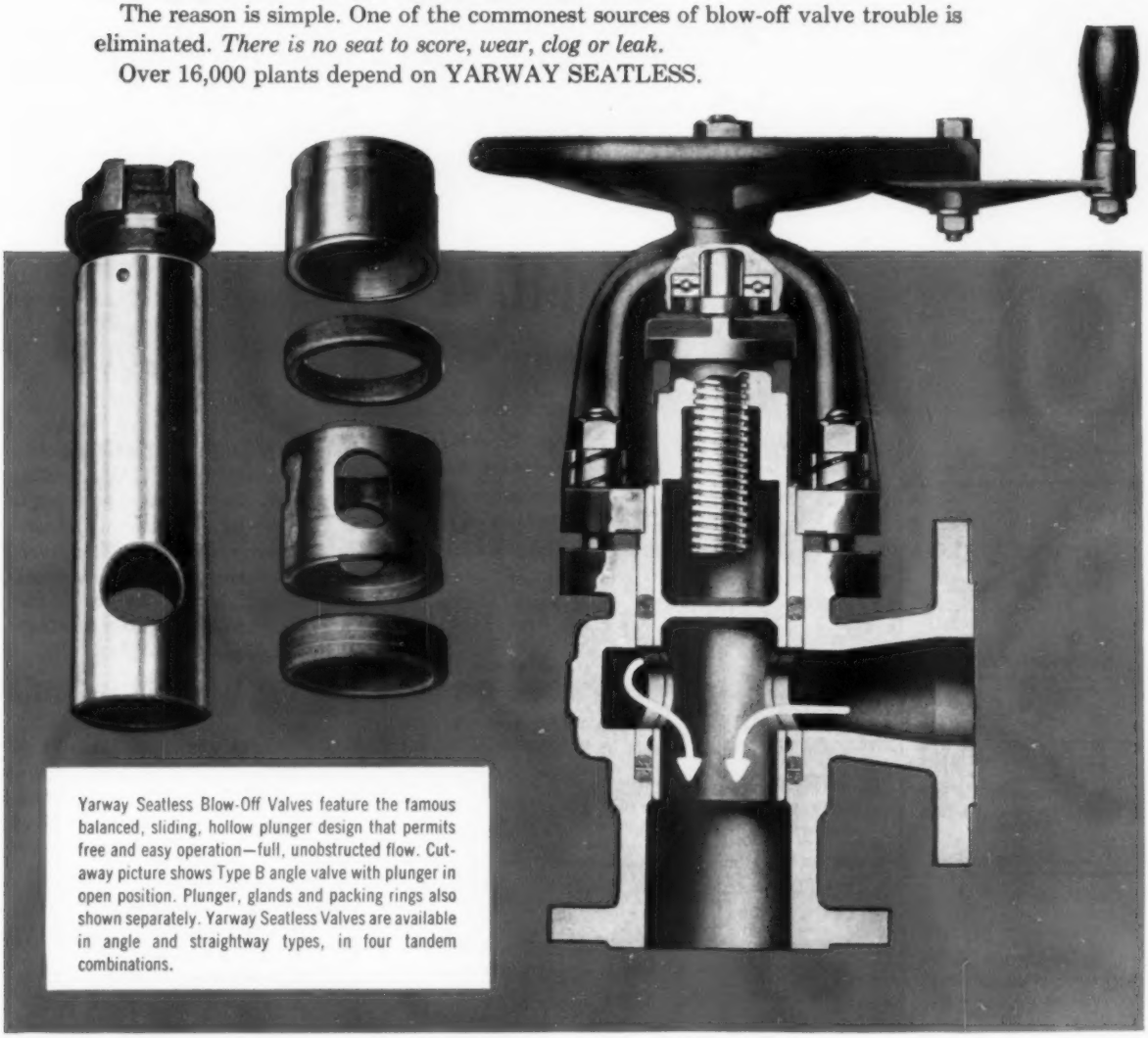
HANDLING GALVANIZED water heater tanks in and out of storage was a costly operation at the Milwaukee plant of the Hotpoint Co. A trailer-train was pulled into the storage area and at least two men

seatless means savings

For nearly 50 years boiler plants in low and medium pressure ranges have been saving maintenance time and down-time thanks to dependable, trouble-free blow-down service from Yarway Seatless Blow-Off Valves.

The reason is simple. One of the commonest sources of blow-off valve trouble is eliminated. *There is no seat to score, wear, clog or leak.*

Over 16,000 plants depend on YARWAY SEATLESS.



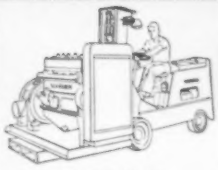
Yarway Seatless Blow-Off Valves feature the famous balanced, sliding, hollow plunger design that permits free and easy operation—full, unobstructed flow. Cut-away picture shows Type B angle valve with plunger in open position. Plunger, glands and packing rings also shown separately. Yarway Seatless Valves are available in angle and straightway types, in four tandem combinations.

For information on Yarway Seatless Valves, sizes, materials, pressures, etc., write

YARNALL-WARING COMPANY 145 Mermaid Ave., Philadelphia 18, Pa.
BRANCH OFFICES IN PRINCIPAL CITIES

YARWAY SEATLESS ...a good way to specify blow-off valves

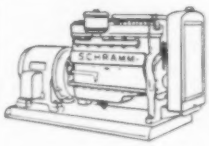
For more facts circle 531 on Reply Card



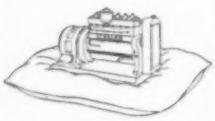
Easy to Move

Unit System

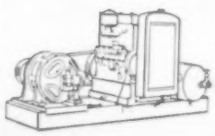
No Elaborate Foundations



Compact



No Vibration



Complete Package

EASY TO MOVE

Relocate Schramm Compressors double-quick for air where you need it

Eliminate long, expensive pipe lines. Take compressors right to the job. Relocate them—singly or in batteries—to meet production plans. Moving is fast and easy with Schramm Compressors. They're compact and easy to handle. They need no elaborate foundations; any floor space serves as a base. And every Schramm Compressor is a *complete package.*

Unit System—Use only as many compressors as you need now. Expand your installation as needs increase.

No Elaborate Foundation—Eliminate this added cost with a vibration-free Schramm installation.

Compact—Take up less space. Put your Schramm Compressor anywhere—take advantage of unused corners.

No Vibration—Schramm Compressors are vibration-free. They need no costly foundations—and they're easier on your buildings.

Complete Package—All you need for your air requirements in a single package . . . compressor, aftercooler, air receiver.

For complete information, write for Catalogs GC-57 and 5510, or see your nearest Schramm Dealer.

See the Yellow Pages for local Sales, Service and Rental of Schramm Air Compressors.

Schramm, Inc.

MANUFACTURERS OF AIR COMPRESSORS

665 North Garfield Ave. • West Chester, Pa.

For more facts circle 532 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 38)

Truck vacuum attachment lifts tanks.

were needed to load, unload and stack the tanks manually.

To speed this operation, a fork lift truck was equipped with a vacuum lifting unit, shaped to follow the curvature of tanks of various diameters, which grips the tanks instantly. With this handling method, labor savings have amounted to 40 per cent of previous cost, while handling is 80 per cent faster. Space can be better utilized, since the tanks can be stacked higher. *From a release of Vac-U-Lift Co., Salem, Ill.*

Meals from Machines

AT UNITED AIR LINES' San Francisco International Airport maintenance base, full-line vending units located near isolated work

Maintenance crew lines up at vending machine for ice cream and other foods.

B.F.Goodrich

Pneumatic tires?

Solid tires?

Free B.F.Goodrich TW TIRE AND WHEEL Analysis tells you which tires are right for your job!

Can save you up to 50% on industrial tire costs!

Do you need a pneumatic or solid industrial tire? What tread design —what tread compound—is best for your materials handling work? The FREE B.F.Goodrich Tire and Wheel Analysis gives you the answers. They're answers that can save you up to 50% on industrial tire costs, up to 20% on maintenance.

Just mail the coupon at the right. Without cost or obligation, a B.F.Goodrich TW Analysis man will study your hauling surfaces, equipment, loads and other problems. Then he'll recommend the *right* industrial tires for you to use. His recommendations are unbiased, because B.F.Goodrich makes a complete line of industrial tires.

Why wait to enjoy the benefits of a FREE B.F.Goodrich TW Analysis? Mail the coupon *today!*

A special consulting service is available to manufacturers of materials handling equipment.

Specify B.F.Goodrich tires when ordering new equipment

B. F. Goodrich Tire Company
A Division of The B. F. Goodrich Company
Department TW-719, Akron 18, Ohio

I would like further information on your FREE TW Analysis.

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STREET_____

CITY_____ ZONE_____ STATE_____

B.F.Goodrich *industrial tires*

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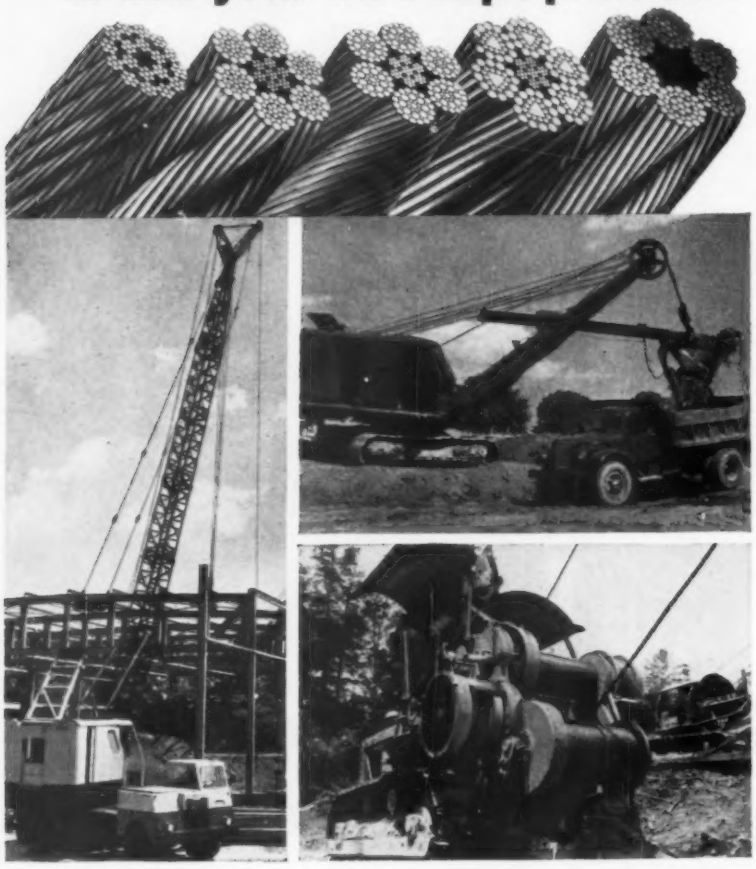
right rope...

is this your wire rope problem?



Matching type or construction to the job is key to wire rope efficiency and economy.

FREE RED-STRAND BULLETIN NO. 107 TELLS HOW.

The ideal wire rope for guying a mast would go to pieces in jig time if used as a hoist rope. Similarly, the best rope for the latter would soon be ruined by bending fatigue if used on equipment which has too small sheaves or requires numerous reverse bends. How to coordinate wire rope and the job to insure maximum service life and operating efficiency in all such variations is very clearly told in Service Bulletin No. 107. Copies free on request. Write H. K. Porter Company, Inc., Leschen Wire Rope Division, 2727 Hamilton Ave., St. Louis 12, Missouri.

LESCHEN Red-Strand WIRE ROPE

H. K. PORTER COMPANY, INC.

LESCHEN WIRE ROPE DIVISION

For more facts circle 534 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 38)

sites, enable workers to eat within their allotted time.

Two years ago a complete food vending service was established for these workers and recently 14 more vending units were installed for hot foods and soup, salads, ice cream, soft drinks, coffee, hot chocolate and milk. This new installation replaced a food service provided by catering truck. *From a release of Vendo Co., Kansas City, Mo.*

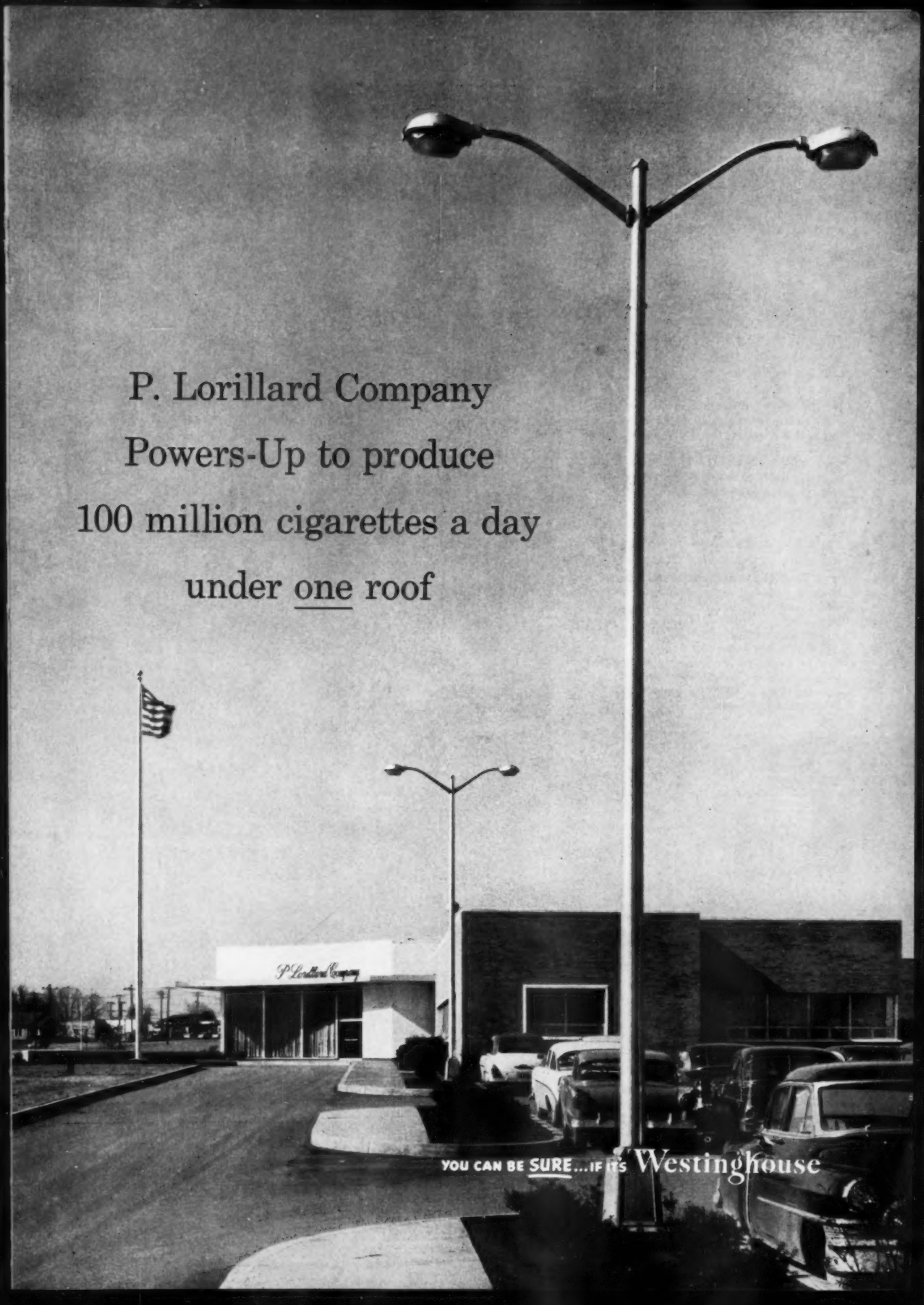
Lead Stripping for Concrete Joints

MORE THAN 1200 ft of extruded lead strips were embedded in the contraction joints of the concrete floors in the renovated Westinghouse Electric Corp. plant in Newark, N. J. They were used in those areas where heavy industrial traffic is anticipated.

The tooled joints were made to accommodate ¼-in. thick by 1-in. deep extruded strips. Their depth was slightly less than 1 in., to permit 1/16 to ⅛ in. of lead to extend above the level of the concrete.

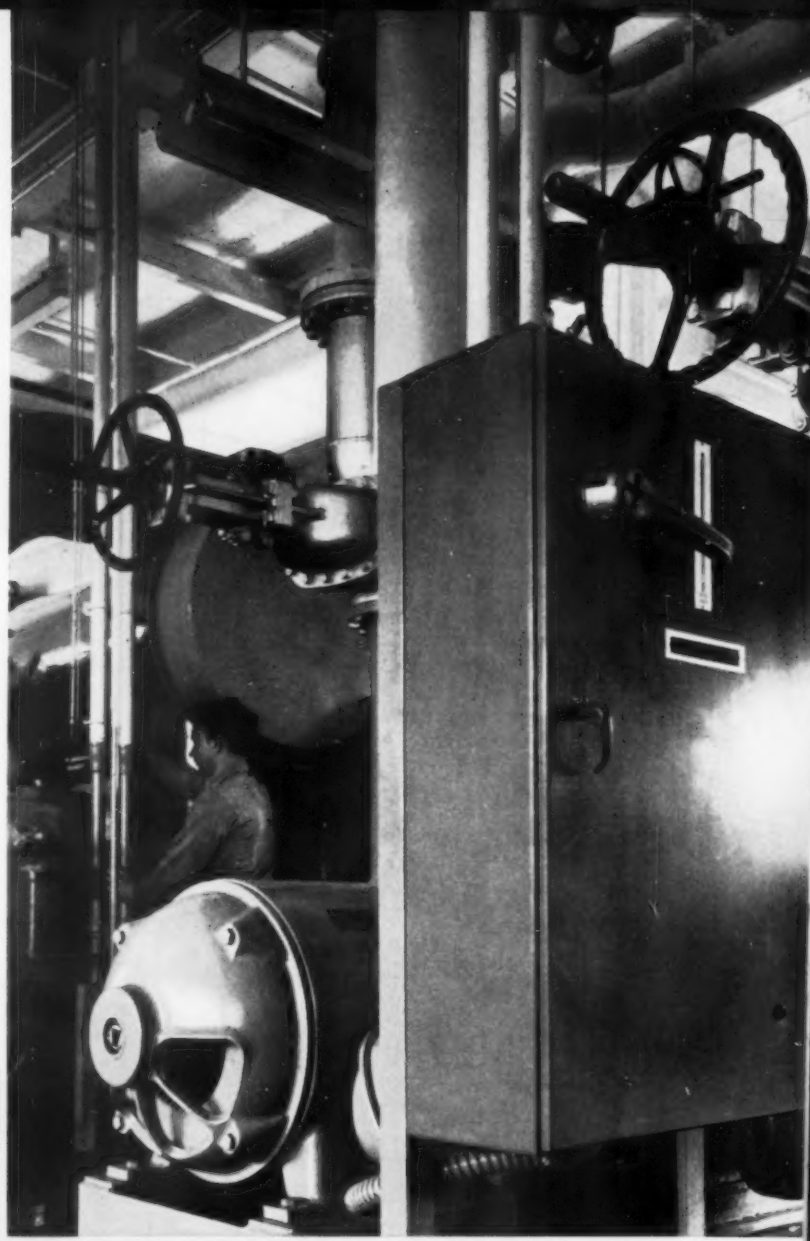
The lead strips were used because no great amount of heat is generated within the joint with this method and, as a result, the possibility of the concrete spalling during installation is avoided. *From Lead, published by Lead Industries Assn., New York, N. Y.*

Lead stripping is hammered into a contraction joint in new concrete floor.


P. Lorillard Company
Powers-Up to produce
100 million cigarettes a day
under one roof
P. Lorillard Company
YOU CAN BE SURE... IF IT'S Westinghouse

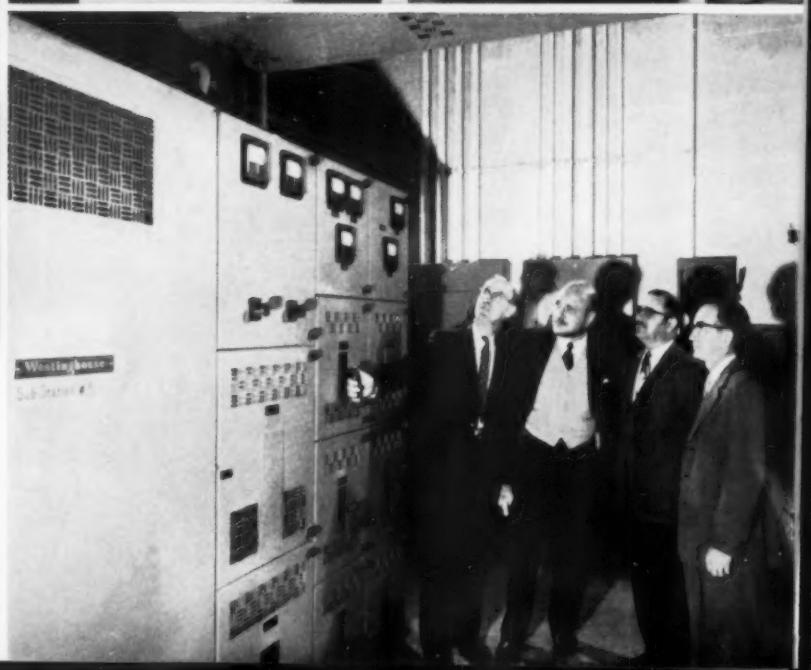
FRONT COVER

The completely new "electromated" Greensboro, N. C. branch of the P. Lorillard Co. is designed for tomorrow's expansion, both in power and plant layout, as well as for today's immediate production needs. Westinghouse type OV-20 outdoor lighting is used for the building approach and 650-car parking area.



▶ A Westinghouse class 11-404 reduced-voltage starter provides automatic starting and protection for the Westinghouse Life-Line® 60-hp motor. The motor is part of a system which automatically controls the "man-made" climate, so necessary in the cigarette-making industry.

▼ A Lorillard maintenance man inspects the class 11-400 reduced-voltage starter which controls the 200-hp Life-Line air compressor motor supplying air to safeguard instruments. A 400-amp, 600-V, AHF-355 safety switch is shown in the background. On the wall (right) are two Westinghouse class 11-404 reduced-voltage starters providing protection for Westinghouse motors.



▶ O. B. Van Hise, Lorillard Plant Engineer; Wm. Folk, Jr., Westinghouse Sales Engineer; J. E. Guill of Starr Electric Co., Inc., Electrical Contractors and Engineers; H. L. Coble, H. L. Coble Construction Co., General Contractor, examine one of the plant's nine dry-type power centers. Power centers have spare circuit breakers plus blank cubicles equipped for future power needs. Overhead bus duct serves as tie-run between power centers.

J-94115-2

Westinghouse electrical equipment used for today's production and tomorrow's expansion

P. Lorillard Company, the nation's oldest tobacco firm, is now occupying the newest and most modern cigarette manufacturing plant in the country. Relying heavily on Westinghouse equipment, the ultra-modern Greensboro, North Carolina plant is electrically powered to expand capacity or to shift emphasis from filters to non-filters (or vice versa) almost overnight.

The plant is unique in the tobacco industry not only in design, but because it represents many departures from standard industry procedure. In some instances, departures were so great that new, complex machinery was designed and built.

Power is transmitted to the completely "electromated" plant at 22,000 volts and stepped down by Westinghouse transformers to 12,500 volts and distributed to nine power centers throughout the plant. These network power centers distribute 480/277 volts and are interconnected to avoid shutdown in the event of a partial power failure.

Lorillard minimized human error and bolstered production by installing Westinghouse-driven and controlled automatic feeder-conveyors to move the processed tobacco in a steady flow above cigarette-making machines, feed it into the machines and automatically maintain the precise level of tobacco in hoppers. This system assures uniform filling and quality of every cigarette.

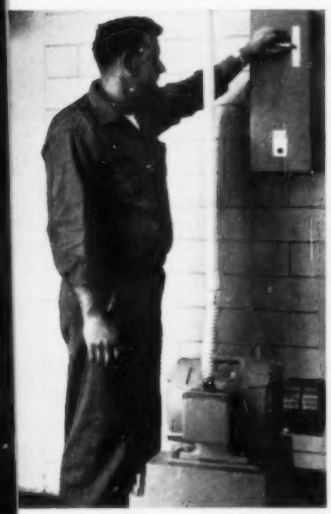
In addition to the substation transformers and electrical equipment for the conveyor system, Westinghouse supplied the power centers, motors and controls for the air conditioning system and outdoor lighting for the building approach and plant parking area.

Westinghouse, working with the architect-engineer, general contractor, electrical contractor and Lorillard engineers, had an active part in equipping this plant with the electrical distribution system and with other electrical components required to assure uninterrupted operation and provide for anticipated expansion. Westinghouse can help with

(cont'd)

S *Over 250 pages Westinghouse data in Sweet's Construction File*

J-94115-3



This Life-Line class 11-204 motor starter, with fusible disconnects, which activates the Westinghouse 3-hp Life-Line "A" motor to drive a 75-gpm pump, is located in the mechanical equipment room of the ultra-modern plant.

Westinghouse class 11-204 combination magnetic motor starters with fusible disconnects provide remote control and protection for Life-Line "A" motors located throughout the conveyor system. Equipment is designed to move tobacco from hogshead to finished cigarette without being touched by human hands.

Straight-line feeder-conveyor system continues through automatic cigarette-making, packing, cartoning and shipping. Westinghouse automatic controls, pushbuttons and switches "spot control" the conveyor process.

YOU CAN BE SURE...IF IT'S Westinghouse

Specially designed for tomorrow's expansion

any phase of your electrical planning and construction. See your Westinghouse distributor, or write: Westingouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-94115-4

Owner: P. Lorillard Company, New York, N. Y.
Architect-Engineers: Lockwood Greene Engineers, Inc.
General Contractor: H. L. Coble Construction Co.
Electrical Contractor: Starr Electric Co., Inc.
Westinghouse Distributor: Westinghouse Electric Supply Co., Greensboro, N. C.

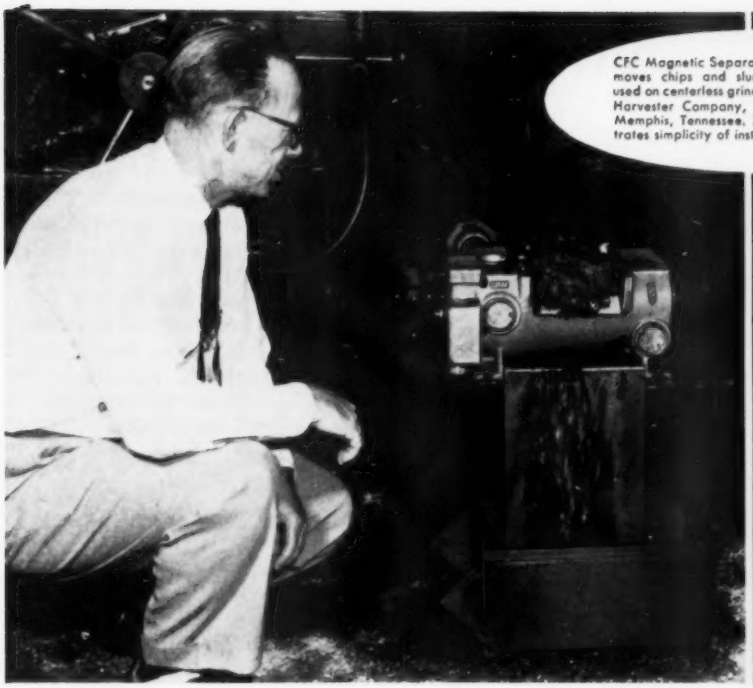
Wm. Folk, Jr. (right) explains the full line of electrical equipment carried by Westinghouse distributors for immediate delivery. This reduces the inventory Lorillard must carry for replacement needs. Others shown left to right: W. D. Rhea, Power Engineer; M. W. Breitmeier, Plant Maintenance; O. B. Van Hise, Plant Engineer; J. Berner, Project Engineer; all of Lorillard Plant Engineering Section.

YOU CAN BE SURE...IF IT'S

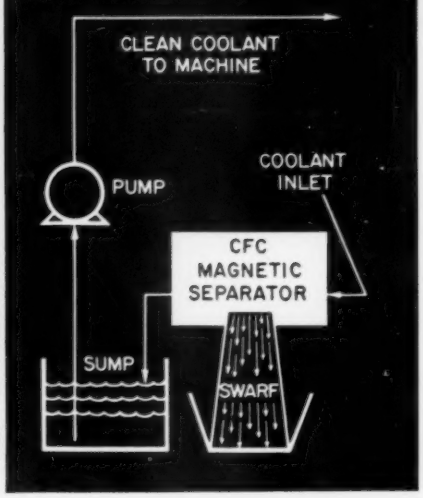
Westinghouse

New complex machinery had to be designed and built by Lorillard to achieve this highly automated plant. J. Berner, Project Engineer, conceived, planned and built much of the special equipment. (Both Berner and R. H. Jobe, Lorillard Draftsman, sport beards in honor of Greensboro's 150th anniversary.)

For more facts circle 535 on Reply Card



CFC Magnetic Separator continuously removes chips and sludge from coolants used on centerless grinders at International Harvester Company, Memphis Works in Memphis, Tennessee. Flow diagram illustrates simplicity of installation.



INTERNATIONAL HARVESTER, MEMPHIS WORKS, saves $4,079 per year with CFC Magnetic Separators

Installed on six centerless grinders at the Memphis Works of International Harvester Company, CFC Magnetic Separators save $4,079.03 per year. This is accomplished by saving 468 man hours in operator's time, sludge removal and coolant replacement. In addition, coolant use was reduced 50%, and grinding wheel replacement was cut 10%. Capital expenditure was less than $2,975.

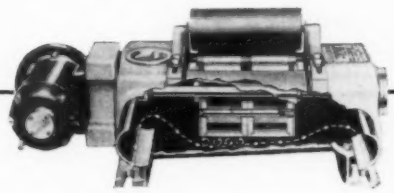
The CFC Magnetic Separator removes ferrous chips and sludge from coolants automatically and continuously. It is compact, lightweight, easy to install — often between machine tool columns. Unit includes totally enclosed gearhead motor. No separate pump is required. Choice of inlets and outlets makes it flexible for any machine tool installation — grinders, gear cutters, thread rollers, honing, broaching, milling, drilling machines, etc. Non-ferrous housing prevents rusting.

The CFC Magnetic Separator is stocked in many local areas to assure quick delivery.

PRICES AS LOW AS $325

Dimensions	No. 1	No. 2	No. 4
Length	21⅜"	21⅜"	22¾"
Height	7⅞"	9½"	11⅞"
Width	11¾"	12¼"	15"
Capacity			
Mineral Oil, max. operating viscosity 170 sus	5 GPM	10 GPM	20 GPM
Water-Based Coolants	10 GPM	20 GPM	40 GPM
Price	$325	$410	$535

All units are sold on a money-back performance guarantee. Write for detailed drawings and technical literature to Dept. PG.



COMMERCIAL FILTERS CORPORATION
MELROSE 76, MASSACHUSETTS
PLANTS IN MELROSE, MASSACHUSETTS AND LEBANON, INDIANA

MICRO-CLARITY AT MINIMUM COST

Fulflo FILTERS — *with genuine Honeycomb Filter Tubes for controlled micro-clarity of industrial fluids.*

CFC FILTERS — *Selective filtration of oils • water-oil separators • magnetic separators • pre-coat filters • coolant clarifiers • automatic tubular conveyors.*

For more facts circle 536 on Reply Card

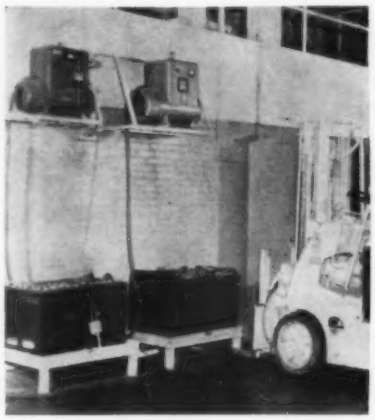
OPERATION AND PRODUCTION —pointers for the industrial plant engineer

Edited by Vern Kempf

Local Charging Areas Save Time

COVERING over 10 acres, the one story plant of Briggs & Stratton at Wauwatosa, Wisc., uses battery charging stations located at key points to keep operator travel time to a minimum. With 36 trucks in constant use, battery and truck maintenance becomes a vital part of plant operations.

Typical of six charging stations is the one located in the shipping department. Charging equipment consists of a four-circuit motor-generator set used to charge 16-cell, 32-volt Gould-National batteries for powering lift trucks and four individual motor-generator sets to handle the 12-cell, 24-volt batteries of 600 amp hr capacity which power the smaller dock trucks.



Wall-mounted battery chargers are located in convenient areas in plant.

Modified constant potential charging is used and most of the batteries are charged every day. All charging is automatically controlled. Present practice calls for two batteries for each truck. This permits giving each battery an equalizing charge every five days. As far as possible, batteries are charged in the trucks.

When it is necessary to remove the batteries from the truck for periodic washing, equalizing charging or special maintenance work, the trucks are taken to the receiving dock where an overhead hoist is available.

Probe Measures Liquid Levels

MAJOR PROBLEM in measuring levels inside tanks containing saturated solutions is the tendency of the liquids to precipitate continuously on any measuring device inserted into the liquid. Level indicating devices employing mechanical or displacement means

(Continued on page 56)

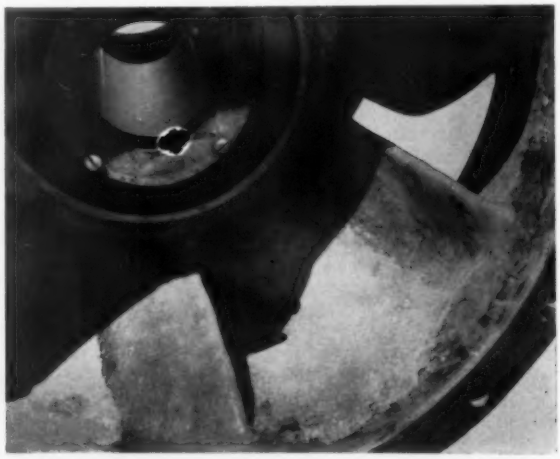
Pump Vane Erosion Problem Solved With Glass Fiber Cloth, Plastic Resin

APPLICATION of modern aircraft protective resins has cut pump maintenance costs at the Silvergate Power Plant of the San Diego Gas & Electric Company. Eight vertical circulating pumps present a serious maintenance problem because of the corrosive punishment of the salt water and the abrasive action of sand and shell debris.

Experiments were conducted with a variety of protective coatings to solve this costly problem. The most successful was the use of a glass fiber cloth coated with a liquid resin produced by Narmco Resins & Coatings Co.

One explanation for the resistance of the resin coatings is that they apparently retain prolonged surface resiliency. Sea water abrasives appear to bounce off the elastic coatings, instead of rubbing and scouring them. The cost of the coating job is estimated at about $100 per pump.

Close-up of pump vane shows extensive damage caused by abrasive sand, shell debris, along with salt water corrosion.



Pump vanes are built up with special resin putty and covered with glass fiber cloth liberally coated with liquid resin.

quickest TO ERECT

quickest TO INSTALL

quickest TO RE-ARRANGE

quickest TO PAY FOR ITSELF

DELUXE

STEEL SHELVING

quickest BECAUSE . . .

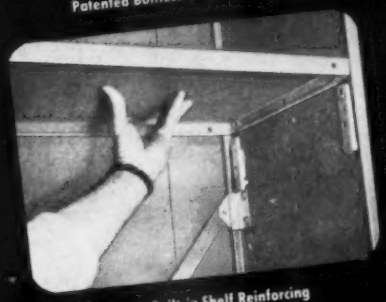
. . . you realized that a shipment of knockdown shelving parts has no useful value. It must first be assembled into shelving racks for storage utility. The faster these racks are erected, the lower your installation cost. So, because Deluxe steel shelving is erected the quickest, your *installed cost* is the lowest.

The film strip shows 6 engineering features of Deluxe steel shelving that promote quickest erection. Take the patented Deluxe boltless shelf bracket . . . it replaces 90% of the time-consuming nuts and bolts and allows not only quickest installation, but easy shelf adjustment.

THE PROOF: At 1958 trade shows, two untrained girls erected a complete closed section of Deluxe Boltless Steel Shelving in *less than 5 minutes.*

Call your local Deluxe dealer or write for the new, complete Deluxe Shelving Catalog No. 30.

Patented Boltless Shelf Bracket



Factory Built-in Shelf Reinforcing

One-piece Bin-type Upright

Snap-in Dividers (horizontal & vertical)

Clip-on Bin Fronts

Bottom Shelf Support and Floor Angle

DELUXE

DELUXE METAL FURNITURE COMPANY · Warren 7, Pa.

A Division of the Royal Metal Manufacturing Company

For more facts circle 537 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 54)

for measuring become clogged and ineffective.

This problem was solved at the Hurricane Creek plant of Reynolds Metals Company, Bauxite, Arkansas, by the installation of a capacitance type electro-mechanical recorder. The sensitive electronic equipment, manufactured by Robertshaw-Fulton Controls Company, is used to measure the level inside a surge tank containing a concentrated solution of sodium aluminate kept near the boiling point.

In addition to the instrument, the installation included a 14-ft flexible probe inserted vertically into the tank through a one-inch threaded connection. The probe is made of ½-in. steel cable sheathed in plastic. Once set into position, the probe measured a 10-ft range of liquid with no further adjustment.

Scale deposits on the sensing electrode do not affect the accuracy of the system. Calibration of the measuring system is accomplished easily with independent adjustments for zero and span, thereby eliminating the necessity of emptying the surge tanks.

Plant Engineer Turns Inventor

WRAPPING insulating tapes on wire and cable has been simplified by an improved device developed by Dean L. Williams, Assistant Plant Engineer, Rome Cable Corporation, Rome, New York. U. S. Patent on the machine has been assigned to Rome Cable.

Vibration, a cause of insulation breakage during production runs, has been reduced. Because it can operate at 4000 rpm, compared to 3000 rpm of the previous model, the machine's daily output is increased. Sealed bearings eliminate the need for oiling.

Advantages of the device are less tape breakage and faster operating speeds.

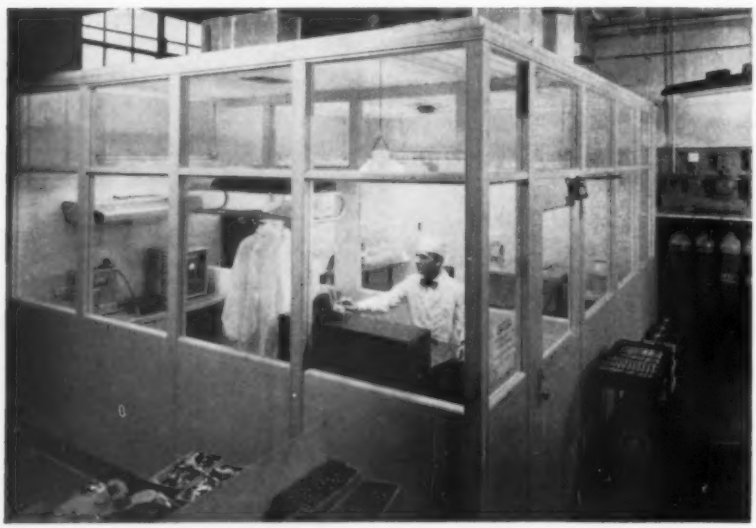
Williams' invention features a two-piece hollow shaft. The rear portion is stationary and is integral with the mounting flange. This results in an extremely rigid

(Continued on page 58)

"Surgical Clean" Final Assembly Room Guards Against Component Failures

SURPASSING the strict requirements of surgical operating rooms, an industrial clean room has recently been placed in operation at Superior Valve & Fitting Company, Pittsburgh, Pa., to process precision valves and parts for missile fuel systems.

Control valves are ultrasonically cleaned, tested, assembled and packaged in heat-sealed polyethylene bags in this sterile room. Automatic control valves in a missile are so sensitive that even the smallest particles of foreign material can cause improper operation of the controls. This sensitivity requires final operations on assemblies be conducted under closely controlled conditions.



Totally enclosed clean room with electrostatic air filters, air conditioning, humidity control equipment, ultrasonic cleaners and inspection and test facilities.

Equipment within the 16-ft by 16-ft room was planned to produce an area that is virtually hermetically sealed. All cooling, heating, cleaning and filtering systems are tied into a common duct and respond to the master control panel within the room. An electrostatic filter cleans and filters dust particles down to 150th micron. Temperature is kept at an absolute 69 F and humidity is maintained at 50 per cent. A positive pressure of two ounces is held to insure an outward flow of air when the doors are opened.

Recycled air in the room is changed ten times an hour. To keep down lint and dust particles, operators within the area wear rubber overshoes, lint-free outer garments and head coverings. Materials are handled in stainless steel or polyethylene containers. All test and assembly fixtures, hand tools and material handling equipment is washed daily with isopropyl alcohol.

NOW A GLASS LINED CORROSIVE RESISTANT VITRIFIED CLAY PIPE

AMVIT JOINTED GLAS-GLAZ

Here's a new product that has everything:

- VITRIFIED CLAY PIPE IN LONGER LENGTHS
- THE FACTORY MADE, MECHANICAL AMVIT PLASTIC JOINT
- GLASS LINED INSIDE AND OUT
- COSTS NO MORE THAN ORDINARY PIPE
- CORROSIVE AND ACID RESISTANT

You can make important savings in first costs and in operating costs with remarkable new Glas-Glaz pipe. It has everything, is quick and easy to install, and will outlast other materials. This low cost, superior product is available due to new manufacturing techniques and research developments.

LOWER MATERIAL COSTS — Glas-Glaz costs substantially less than metals, alloys, or lined materials commonly used for corrosive service.

LOWER INSTALLATION COSTS — Glas-Glaz can be installed quickly and easily. The joint, made from plasticized resins of polyvinyl chloride, is on the pipe delivered ready for installation. All you do is push the ball and socket together.

LOWER MAINTENANCE COSTS — Glas-Glaz is acid resistant, resists abrasions and corrosion, will not rot, rust, or deteriorate.

Plant and process engineers can specify Glas-Glaz and *be sure of performance.* It's the only clay pipe designed for industrial and commercial use wherever highly corrosive wastes are encountered.

Write for a descriptive folder now.

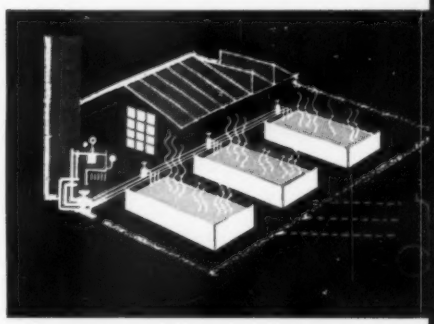
SINCE 1848

AMERICAN

American Vitrified Products Company

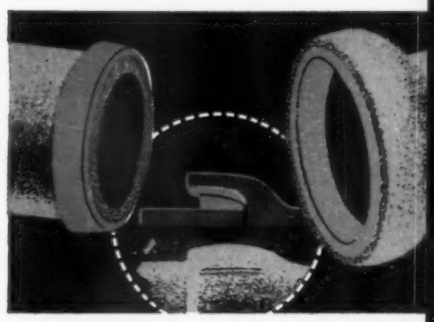
NATIONAL CITY BANK BUILDING
CLEVELAND, OHIO

SMOOTHER—Nothing can adhere to the glossy, glass surface of Glas-Glaz. The design of the Amvit Joint assures that the pipe is self-centered for self-cleansing action.



ACID RESISTANT—The interior surface of Glas-Glaz is of impervious chemically resistant glass. It positively cannot be harmed by sewage, chemicals, or hot liquids, and is especially adaptable for industrial wastes and chemical lines.

STRONGER—Amvit Joint is pliable, permitting reasonable deflection without leakage. The resiliency of the Amvit Joint permits it to absorb shocks or vibrations that cause failures in a more rigid type of joints.



FOOLPROOF JOINT—Amvit Joint is a true mechanical joint made from plasticized resins of polyvinyl chloride. It is a compression type joint on the ball and socket principle. When the joint is made, the surfaces of both bell and spigot rings are in constant high compression.

For more facts circle 538 on Reply Card

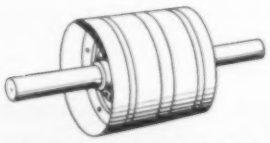
This is

INDOX V...

and STEARNS knows how to use it!

Amazing new ceramic permanent magnet material inspires revolutionary developments in tramp-iron protection.

First to take advantage of the remarkable magnetic properties of Indox V is Stearns — the leader in design and development of magnetic equipment for more than 40 years. *Only Stearns uses Indox V* in magnetic tramp-iron separation equipment. Here are four brand-new Stearns separators that are introducing a new era of tramp-iron protection for all industry.

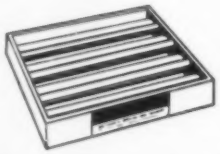


NEW INDOX V MAGNETIC PULLEY

Installed at head of belt conveyor system, outperforms conventional permanent magnet pulleys, equals deep-field power of electromagnetic types. Radial design boosts holding efficiency for maximum separation. Standard widths and diameters to match your present system. Ask for Bulletin No. 1021-T.

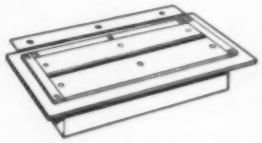
NEW INDOX V MAGNETIC DRUM

An ideal unit for process industries where granular materials are conveyed in enclosed chutes or spouts. Revolving stainless steel cylinder inside a welded steel housing carries material over stationary magnet assembly, which holds iron particles beyond discharge of non-magnetic product. Indox V produces exceptionally uniform field *30 to 40 percent stronger* than old-style permanent magnet drums. Complete range of types and sizes for any installation. Write for Bulletin No. 1051-T.



NEW INDOX GRATE MAGNET

Easily installed in any hopper or floor opening, chute or duct, guards your product and plant against dangerous tramp iron. Collecting tubes, with continuous magnetic poles along their entire length, leave no "dead" spots. Effective area is actually 400 percent greater than in ordinary grate magnets! Complete range of types and sizes for any installation. Bulletin No. 1072-T.



NEW INDOX V PLATE MAGNET

Provides separating efficiency far superior to ordinary plate magnets. Powerful, uniform magnetic field traps iron particles in flowing material in chutes, ducts, spouts or on conveyors. Excellent tramp-iron protection at low cost. Write for Bulletin No. 1073-T.

WHAT IS INDOX V?

Indox V is a highly oriented barium ferrite ceramic material. Its energy is comparable, on an equivalent weight basis, to that of Alnico V — the most powerful permanent magnet material available. Indox V magnets possess unique advantages — light weight, high electrical resistivity, great resistance to demagnetization, inexpensive, non-critical raw materials—plus an energy product over three times that of non-oriented ceramic magnets. Indox V is used in separators manufactured by Stearns exclusively.

STEARNS MAGNETIC PRODUCTS

A DIVISION OF THE INDIANA STEEL PRODUCTS COMPANY

635 SOUTH 28TH STREET • MILWAUKEE 46, WISCONSIN

For more facts circle 539 on Reply Card

OPERATION — PRODUCTION

(O and P begins on page 54)

mounting which helped reduce vibration. Tension on the tape being wound can be adjusted while the machine is in operation.

Portable Broach Replaces Reamer

CLOSE-TOLERANCE holes are now being broached instead of reamed at Boeing Airplane Company. The equipment consists of a hydraulic puller and power unit, manufactured by Chicago Pneumatic Tool Company, and the broach, a product of Pioneer Broach Company. The power unit is an air-driven

Air-driven power unit supplies hydraulic pressure to hand-held broach puller.

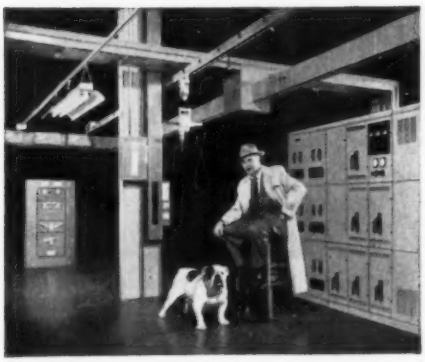
pump to supply hydraulic pressure to the broach puller.

Tests have proven that hand broaching has several advantages over the hand reaming method formerly used. Broached holes are more accurate, the finish is better, tool life is longer and operator safety is improved.

Sheet Feeder Speeds Production

AUTOMATIC FEEDING of tinplate to punch presses at the Chicago plant of W. H. Hutchinson & Son, Inc., has resulted in increased production and eliminated manual

New circuits in seconds at half the cost!



COORDINATED COMPONENTS. BullDog equipment works together to feed specific industrial, commercial or institutional power needs. Whether it be LO-X®, Plug-In Duct, a substation or a complete distribution system, BullDog can put your business in top electrical shape and keep it there!

© BEPCO

As power goes, so goes production. Recently, an automotive parts plant smoothed major kinks in *both* with an installation of BullDog Plug-In BUStribution® Duct. Where powering new machines and constant shifting of existing equipment once meant electrical downtime and delay, machines now plug into power in seconds. No rewiring, downtime or costly production halts. And the electrical cost of moving and adding machinery has been slimmed by 47%.

Plug-In Duct is part of a complete *electrical* distribution system engineered by BullDog for capacity, reliability, *flexibility*. Very probably BullDog products can inject new efficiency and economy in your operations, too. Consult the BullDog Field Engineer or your electrical contractor. Or write BullDog Electric Products Company, Detroit 32, Michigan.

BULLDOG

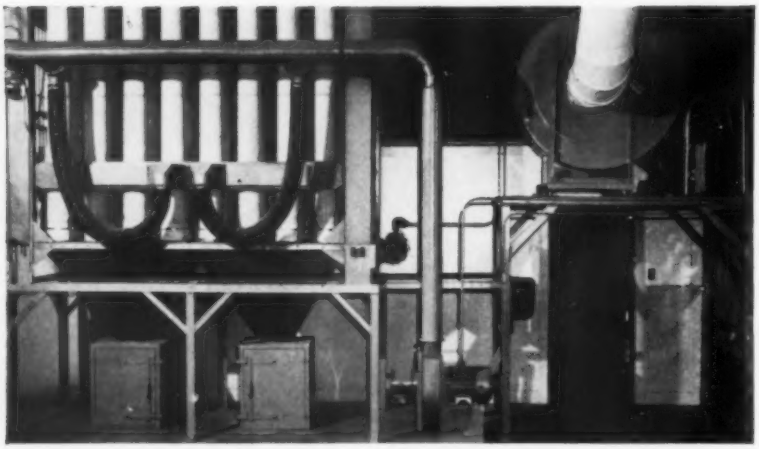
BullDog Electric Products Company, Division of I-T-E Circuit Breaker Company, Detroit 32, Mich. *BullDog Export Division:* 13 East 40th St., New York 16, N.Y. *In Canada:* BullDog Electric Products Co. (Canada) Ltd., 80 Clayson Rd., Toronto 15, Ont.

HEAT BETTER ELECTRICALLY

For more facts circle 540 on Reply Card

DAY

DUST CONTROL NEWS



An unhoused DAY "AC" dust filter* operating in work area of a manufacturing plant.

CUT FUEL COSTS—Return clean, warm, filtered air to work area

If you'll investigate, you'll find nearly all dust filters made are available only as **housed units** . . . BUT with DAY "AC" filters, housing is optional. Housed units are necessary when located outside or when placed on suction; UNHOUSED DAY filters can be placed in any convenient plant location. Using DAY UNHOUSED filters means you not only eliminate the cost of filter housing and exhaust piping but cut your fuel bills as well.

DAY "AC" filters are used to clean air in all types of industry . . . for filtering atomic energy dusts and even the air in oxygen manufacturing plants where the elimination of air pollution is most essential. For more information about DAY "AC" dust filters write for Bulletin F-75. It contains useful charts and air engineering data. Write toDAY for your free copy.

*Licensed by H. J. Hersey, Jr.

The DAY Company

SOLD in UNITED STATES by
The DAY SALES Company
810 Third Ave. N.E., Minneapolis 13, Minn.

SINCE 1881

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EQUIPMENT ONLY OR A COMPLETE SYSTEM

For more facts circle 541 on Reply Card

OPERATION—PRODUCTION

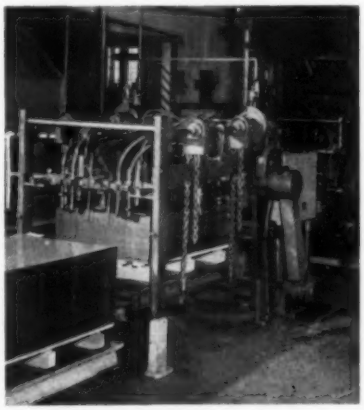
(O and P begins on page 54)

handling of sheets at the presses. Skidloads of sheets are deposited by fork truck on a roller conveyor at the rear of the feeder supplied by the Dexter Company.

These skids are rolled onto the feeder platform and the platform elevated by pushbutton control to feeding mechanisms. At this point, an automatic pile-height governor assumes control and indexes the load upward as sheets are fed off. The sheets are fed into the punch press and registered perfectly so that the decorated portions of the sheet are accurately punched and simultaneously formed.

Reloading is continuous and requires no interruption of the operation. While a pile is being fed off, a new skid-load is deposited on the standby conveyor. When the pile has diminished to the last 1½ in., a fork is inserted between the pile and the feeder platform and secured to the frame of the machine, thus supporting the remaining sheets.

While the feeder continues to deliver sheets, the elevator is



Feeder platform automatically raises as sheets are fed off the top of the pile.

lowered, the empty skid removed, and a new skid-load rolled into place. The elevator is then raised until the top of the new load engages the remainder of the previous pile. The fork is now withdrawn and the remaining sheets settle on top of the new pile.

Suction cups at the rear corners

Hall Industrial Water Report

VOLUME 6 SEPTEMBER 1958 NUMBER 5

Drought Ends in Dry Southwest

Long-overdue rains have brought desperately needed water to the southwest mining industry. With water supply less critical, mine operators can breathe easier. But the abundance of water does not mean that they, or operators of any industry using water, can be less vigilant in treating the water for service, cooling, boilers, process or waste.

Hall Engineers are particularly helpful when water is at its worst. However, their services are just as important when more and better water is available. Even the best water usually requires treatment to avoid problems such as turbidity, scale, corrosion, foaming or biological slimes. Water can always cause trouble.

Softener Bypassed

The feedwater for a waste-heat boiler at a southwestern smelter is zeolite softened and then dealkalized by ion exchange. Tests showed the treated water to be normally soft and free of brining solution.

These apparently good conditions were belied by excessive phosphate consumption and by the presence of a lot of sludge in the boiler. Further testing revealed that the dealkalized water was almost one-half as hard as the raw water.

Together with the operating men, Hall Engineer J. F. Nelson made a thorough search for the source of the hardness. The "leak" was found to be an open valve in a bypass pipe around the zeolite softener. The valve had been opened when a temporary demand for water had exceeded the softener capacity and had not been closed.

With the valve closed, phosphate consumption dropped to its normal level. Nelson recommended installation of another zeolite softener so there will never be any need to open the valve in the bypass line.

Tailoring Water

A Pennsylvania manufacturer of mining tools operates electric induction furnaces cooled with well water high in temporary hardness and iron. The water also contains a lot of hydrogen sulfide—enough so that employees carried drinking water from their homes to avoid the bad taste and odor of the plant water.

Use of the poor quality water resulted in accumulation of deposits in the furnace cooling coils. The furnaces had to be shut down for cleaning about every second week.

When Hall Engineer D. C. Altenburger reviewed the situation with plant personnel he recommended the addition of Calgon® to the water at each well. Also chlorination of the mixed water to destroy the hydrogen sulfide.

Now, after several months, no cleaning of furnace coils has been necessary. The water no longer has an odor and employees can drink it at the fountains.

Boiler Damage Prevented

After trying unsuccessfully for three days to reestablish satisfactory boiler water conditions following a sudden large increase in dissolved solids and disappearance of phosphate and alkalinity, a Michigan salt refinery called on Hall Engineer C. H. Turner for help. On arriving at the plant he found that feedwater composition was normal but boiler water conditions were intolerable.

Turner's first acts were to open wide the continuous blowdown, arrange for hourly opening of main blowoff valves and start feeding large quantities of phosphate and caustic soda. Seven hours later, conditions were nearly back to normal.

The next move was to determine the source of the trouble. This wasn't easy because no one had noted anything out of the ordinary except the change in boiler water conditions. About 3:30 a.m., when almost everyone had gone home, Turner talked with the janitor, who knew nothing about the trouble but did furnish the vital clue. He recalled that the turbo-generator had been out of service for a short period a few days before. Turner reasoned from this that steam pressure on the salt pans had dropped low enough to permit gross contamination of condensate by inleakage of salt brine high in calcium chloride.

The steps taken prevented damage to the boiler so the only cost to the plant was the extra chemicals required. Profiting by this cheap warning, the plant has made changes to prevent a recurrence of the difficulty. Leaks in the salt pans have been repaired and devices have been installed to detect any further contamination of condensate.

Nitrogen Capping

Some standby boilers must be kept filled with water, ready for service. Chemical treatment protects the surfaces contacted by water. However, protecting superheaters and reheaters from corrosion is more difficult. The problem is being solved in some plants by maintaining nitrogen under slight pressure in all vapor spaces of idle boilers, superheaters and reheaters.

Nitrogen capping is also being used for standby protection of heaters, turbines, piping, pumps, etc. Surge tanks, receiver tanks and similar equipment can even be protected during operation. The essential features are: (1) an uninterrupted supply of nitrogen low in oxygen content; (2) nitrogen pressure held higher than atmospheric pressure; (3) routine checks to make sure there are no lapses in this control.

Industrial Water Problems Require Special Handling

There are no "stock answers" to industrial water problems. For information on how the Hall System can help you solve *your* water problems, write, wire or call address below.

Water is your industry's most important raw material. Use it wisely.

HALL LABORATORIES

DIVISION OF HAGAN CHEMICALS & CONTROLS, INC.
HAGAN BUILDING, PITTSBURGH 30, PENNSYLVANIA
DIVISIONS: CALGON COMPANY, HALL LABORATORIES
IN CANADA: HAGAN CORPORATION (CANADA) LIMITED, TORONTO

Hall Laboratories—Consultants on Procurement, Treatment, Use and Disposal of Industrial Water

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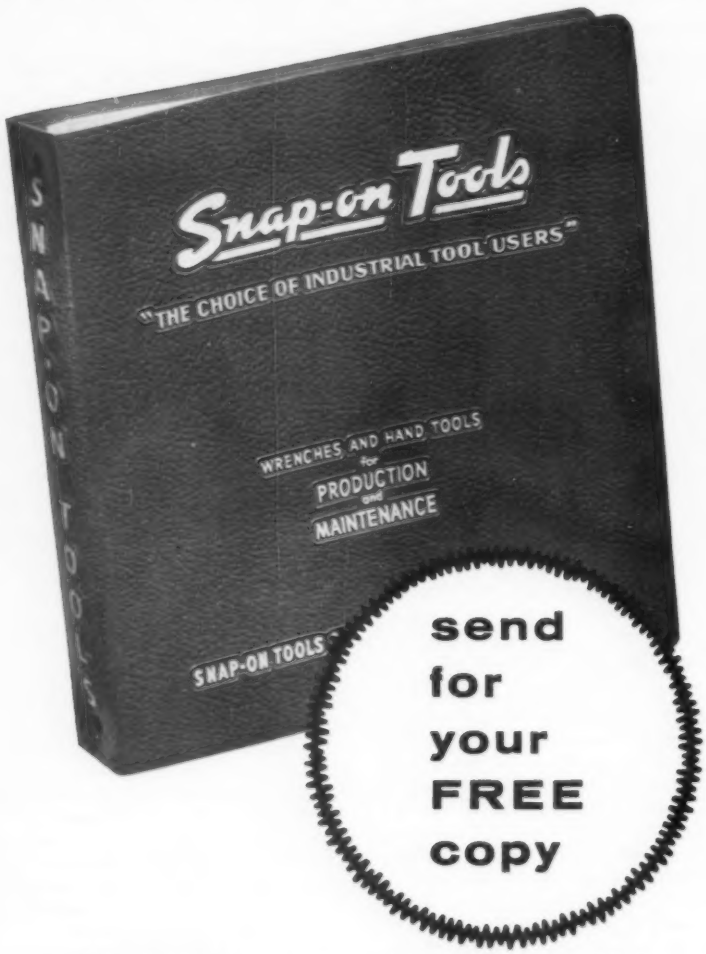
NEW Snap-on
INDUSTRIAL TOOL CATALOG



send for your FREE copy

Here is a complete, 156-page, hand tool buying guide for purchasing agents, engineers, production and maintenance officials — anyone concerned with the use of hand tools for assembly, maintenance, field service and original equipment repair kits.

Users of power-driven nut runners and impact wrenches will find this book a handy order guide to answer every socket need. Every type, every size is tabulated with important dimensions and specifications listed clearly.

Also included is a complete range of automotive tools and shop equipment for car and truck fleets.

Write for your copy today.

SNAP-ON TOOLS
CORPORATION

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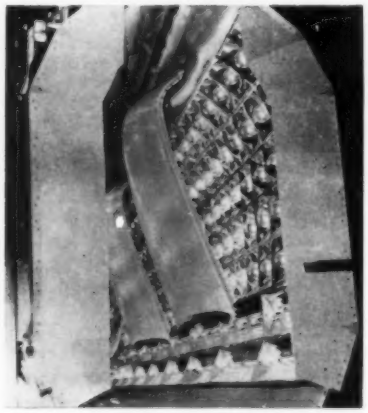
For more facts circle 543 on Reply Card

OPERATION — PRODUCTION

(O and P begins on page 54)

of the feeder lift the top sheet as a blast of air blows between it and the pile to affect complete separation. Front vacuum cups then engage and lift the sheet, and pivot forward to advance it between drive rollers for transfer to the press. Should two sheets be fed at the same time, a mechanical caliper stops the feeder before these sheets reach the press.

Dries Parts in Three Minutes



Infrared oven used at Ford Motor Company's assembly plant, St. Paul, Minnesota, dries metal parts prior to painting. The water dry-off operation is completed in three minutes. Furnished by Fostoria Pressed Steel Corporation, the oven is specially designed with quartz lamps in lower section to avert breakage from dripping water.

Tilt Table Speeds Assembly

FASTENING a completed television chassis in proper position within the cabinet is a simple operation at the Westinghouse Electric Corporation's television and radio division in Metuchen, New Jersey.

On the final assembly line the operator positions the cabinet, which has been preassembled to a paper-board shipping pallet, on an air-operated tilt section. After checking the chassis position in the tilt fixture, she pushes twin buttons activating an air cylinder which rotates the fixture.

The chassis is then fastened to the cabinet with self-tapping screws, using an air-driven screw-

HANDLING STEEL SHAPES of all types, this American 300 Series Self Propelled Crane sets a fast pace in the yards of a midwestern manufacturer. Dependable, versatile American Cranes have fast cycling, fast travel and precision load control that keeps materials moving fast in industries throughout the country.

102,000 LBS. OF STEEL UNLOADED, SORTED, STOCKPILED IN ONE HOUR

This American 30-ton capacity Self Propelled Crane picked steel from a gondola, traveled an average of 40 feet, spotted its load and returned to the car . . . every 3½ to 4 minutes it completed a trip—and averaged 3 to 3½ tons every time. In one hour a car containing 102,000 pounds of structural steel including angles, T bars, I beams, etc., was unloaded, sorted and stockpiled.

Smooth power and unusual mobility combine with the American's precise control system to produce continuously high materials handling rates with all kinds of loads. True machine balance permits rapid travel with excellent stability.

You can tailor American Self Propelled Cranes to every job in your yard with interchangeable fronts . . . crane boom, grapple, clamshell, dragline, shovel or magnet. American Magnet Cranes have exclusive, push button controlled "over-excitation" that boosts pick-up capacity by as much as 20%!

The demands of every industry are met by a complete line of American cranes, derricks and hoists. For all the facts on the American that will perform your materials handling job best—and fastest—for the name of your nearest American Distributor, write:

EXCAVATORS-CRANES
to 2 yds.-50 tons
LOCOMOTIVE CRANES
to 130 tons
DERRICKS-HOISTS
to 800 tons
REVOLVER CRANES
to 400 tons

AMERICAN HOIST
and Derrick Company
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AMERICAN HOIST PACIFIC COMPANY
Special materials handling equipment

CROSBY-LAUGHLIN DIVISION
Drop forged fittings for wire rope-chain

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"Buffalo"
Breezo-Fin Unit Heater

LEAK-PROOF MEANS SAFE FOR HIGH-PRESSURE STEAM JOBS!

Nothing can match the "Buffalo" Breezo-Fin Unit Heater for versatile, economical, efficient "spot-heating" in your plant. Breezo-Fins are especially desirable for your high pressure steam system because **there is no possibility of leakage inside the unit.** The one-piece, seamless copper coil is continuous from inlet to outlet discharge ground joint. This positive "no-leak" feature insures absolute safety for steam pressures up to 250 lbs.

OTHER "BUFFALO" BREEZO-FIN FEATURES:

- **Fins spaced for maximum radiation.**
- **Adjustable louvers to aim heat where needed**
- **Streamlined, attractive appearance.**
- **High-efficiency fans give quiet operation.**
- **One-piece welded motor mounting.**
- **Rugged construction for trouble-free life.**
- **Side connections for low headroom, more compact installation.**

For full information on "Buffalo" Breezo-Fin Unit Heaters, write today for Bulletin 3137-E.

FOR HEATING LARGER PLANT AREAS . . .

investigate "Buffalo" Lowboy and Highboy Unit Heaters. Ceiling-suspended Lowboys save valuable floor space. Compact Highboys allow more productive space in low-ceiling areas. Write for Bulletin 3704 for full details.

BUFFALO FORGE COMPANY
166 Mortimer Street • Buffalo, N. Y.
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.
Sales Representatives in All Principal Cities

"Buffalo"

INDUSTRIAL EXHAUSTERS BELTED VENT SETS PROPELLER FANS "E" BLOWERS-EXHAUSTERS

For more facts circle 545 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 54)

Air cylinder operates tilt section to permit rapid assembly of television sets.

driver. When all screws are in place, a safety catch is released and a pushbutton operated causing the tilt section to return to its normal position. The complete television set and pallet are then moved off the skate-wheel tilt section onto the roller conveyor.

200 Ft-c Light To Sort Scrap?

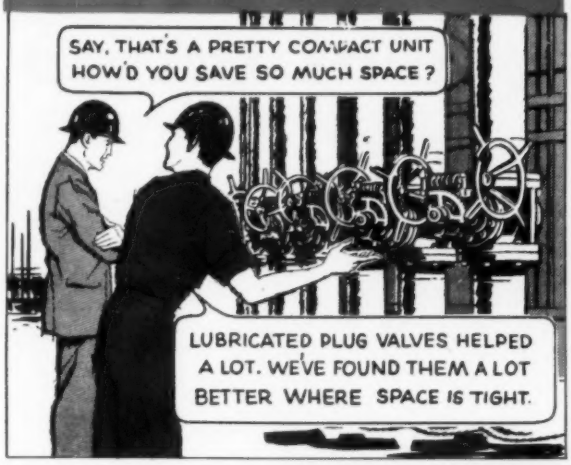
PRODUCING ten times more light than is found in many manufacturing plants, the lighting system installed at the General Iron and Metal Company, Inc., Chicago, Ill., has reduced customer complaints and increased worker morale and efficiency.

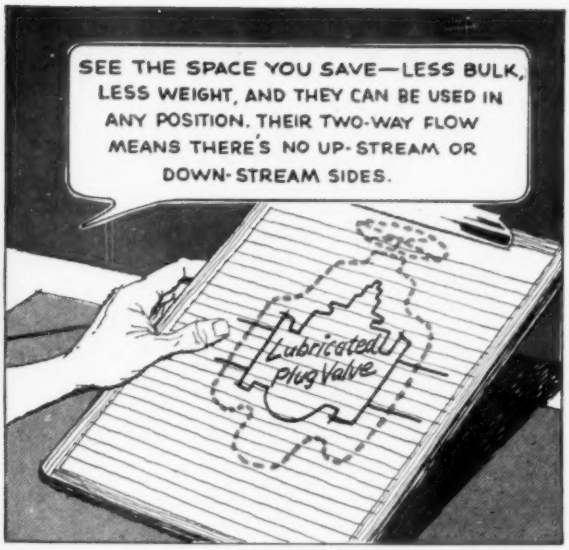
The company buys scrap metal from screw machine plants and sorts it for resale to smelters, refineries and foundries. The sorting process requires a great deal of close visual inspection to determine the type and quality of metal contained in the scrap part. Emphasizing the importance of accurate visual identification, a bale of copper may bring a price varying from $300 to $1000 depending upon the market and the accuracy of sorting.

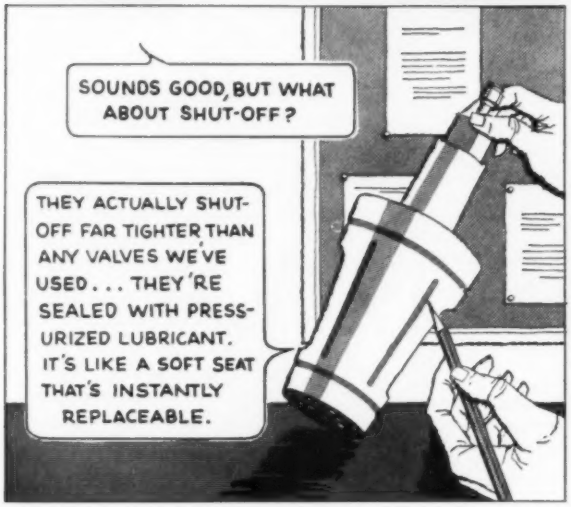
Fixtures are installed in continuous rows 12 ft apart, 13 ft above floor. General Electric Power-Groove fluorescent lamps are used, 200 ft-c in one section where the seeing task is most critical and 180 ft-c in less critical areas.

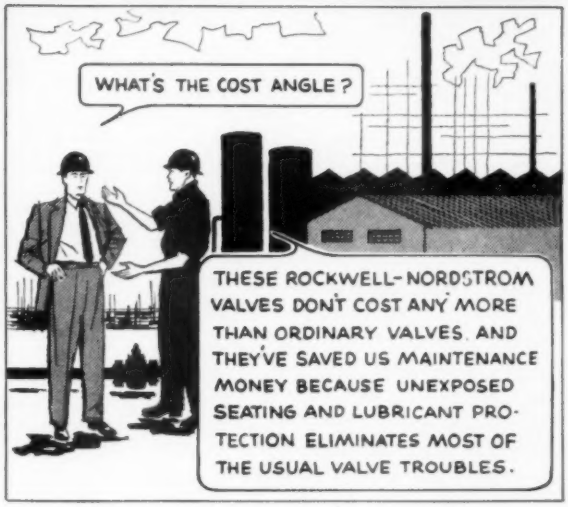
COST CUTTING IN ACTION

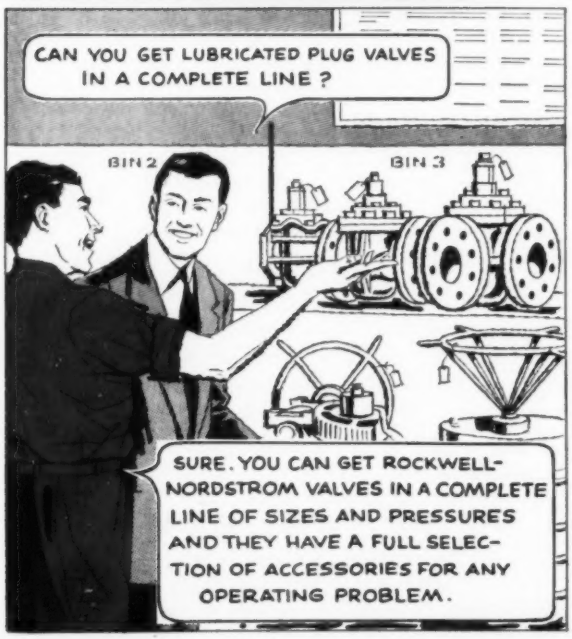
by Rockwell-Nordstrom


SAY, THAT'S A PRETTY COMPACT UNIT HOW'D YOU SAVE SO MUCH SPACE?
LUBRICATED PLUG VALVES HELPED A LOT. WE'VE FOUND THEM A LOT BETTER WHERE SPACE IS TIGHT.


SEE THE SPACE YOU SAVE—LESS BULK, LESS WEIGHT, AND THEY CAN BE USED IN ANY POSITION. THEIR TWO-WAY FLOW MEANS THERE'S NO UP-STREAM OR DOWN-STREAM SIDES.
Lubricated plug Valve


SOUNDS GOOD, BUT WHAT ABOUT SHUT-OFF?
THEY ACTUALLY SHUT-OFF FAR TIGHTER THAN ANY VALVES WE'VE USED... THEY'RE SEALED WITH PRESSURIZED LUBRICANT. IT'S LIKE A SOFT SEAT THAT'S INSTANTLY REPLACEABLE.


WHAT'S THE COST ANGLE?
THESE ROCKWELL-NORDSTROM VALVES DON'T COST ANY MORE THAN ORDINARY VALVES. AND THEY'VE SAVED US MAINTENANCE MONEY BECAUSE UNEXPOSED SEATING AND LUBRICANT PROTECTION ELIMINATES MOST OF THE USUAL VALVE TROUBLES.


CAN YOU GET LUBRICATED PLUG VALVES IN A COMPLETE LINE?
BIN 2
BIN 3
SURE. YOU CAN GET ROCKWELL-NORDSTROM VALVES IN A COMPLETE LINE OF SIZES AND PRESSURES AND THEY HAVE A FULL SELECTION OF ACCESSORIES FOR ANY OPERATING PROBLEM.

ROCKWELL-Nordstrom VALVES

it's **ROCKWELL**

MANUFACTURING COMPANY

Rockwell-Nordstrom valves are available in a complete range of sizes and ratings in semi-steel, steel, stainless steel and other corrosion resisting metals.

Send Coupon For Free Literature

Rockwell Manufacturing Company
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Department CS Pittsburgh 8, Pa.

☐ Please send me complete information on Rockwell-Nordstrom valves for process, industrial and manufacturing flow control.

☐ Please send me the name of your nearest distributor . . . ask him (to) (not to) call immediately.

Name _____ Title _____

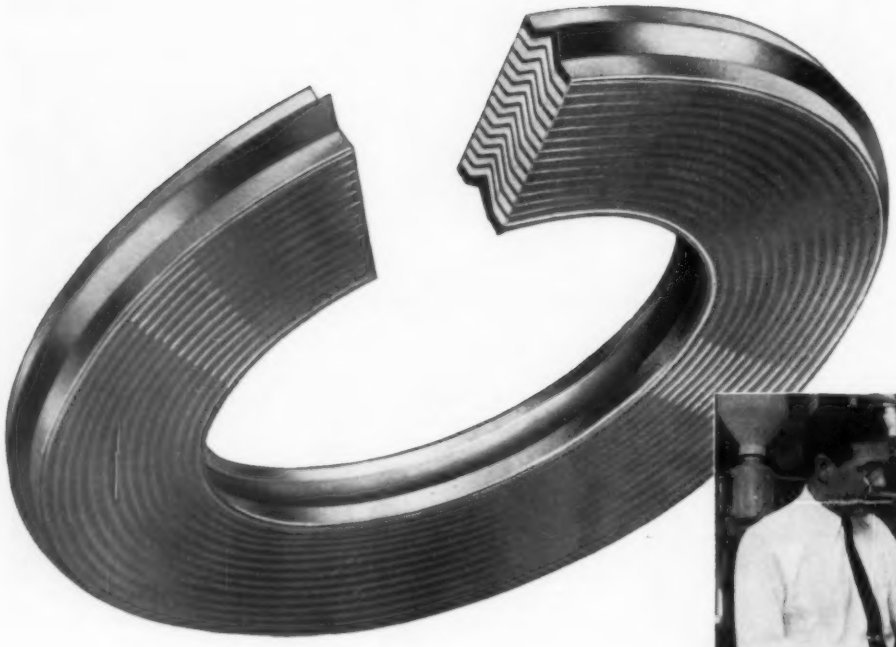
Firm _____

Street _____

City _____ Zone _____ State _____

For more facts circle 546 on Reply Card

Why PLANT ENGINEERS with these



Automatic spring action of V-shaped metal plies react to variations in compression, internal pressures, and temperature changes. Assure leak-proof seal under most severe conditions.

GARLOCK GUARDIAN* GASKETS

Provide a safe, positive seal against high temperatures and pressures of steam, oils, gases, liquids.

Construction assures dependable sealing under varying service conditions. Strips of V-shaped stainless steel, alternated with layers of asbestos, are spiral wound to form the gasket. The number of windings are varied to accommodate different established bolt loads.

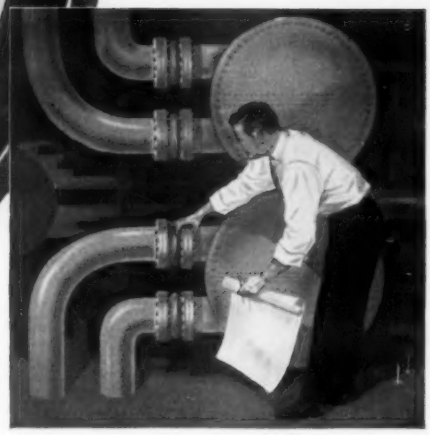
If you have sealing problems involving temperatures to 1050° F. and pressures to 2500 psi be sure to investigate the advantages of Guardian Gaskets. Available in round, oval, square, flat side, diamond, and pear shapes in practically any size. Write for descriptive folder AD-104.

*Garlock trademark

GARLOCK

Packings, Gaskets, Oil Seals, Mechanical Seals, Molded and Extruded Rubber, Plastic Products

protect equipment GARLOCK products



Withstand higher pressures and outlive metal expansion joints . . . do not crack, corrode, lose shape, or require gasketing. Maximum service life at temperatures to 180° and pressures to 125 psi.

GARLOCK RUBBER EXPANSION JOINTS

Prevent flange breakage and equipment breakdowns. Undue stress caused by misalignment, vibration, expansion or contraction of piping or equipment will break connecting flanges. Garlock Rubber Expansion Joints relieve such stresses.

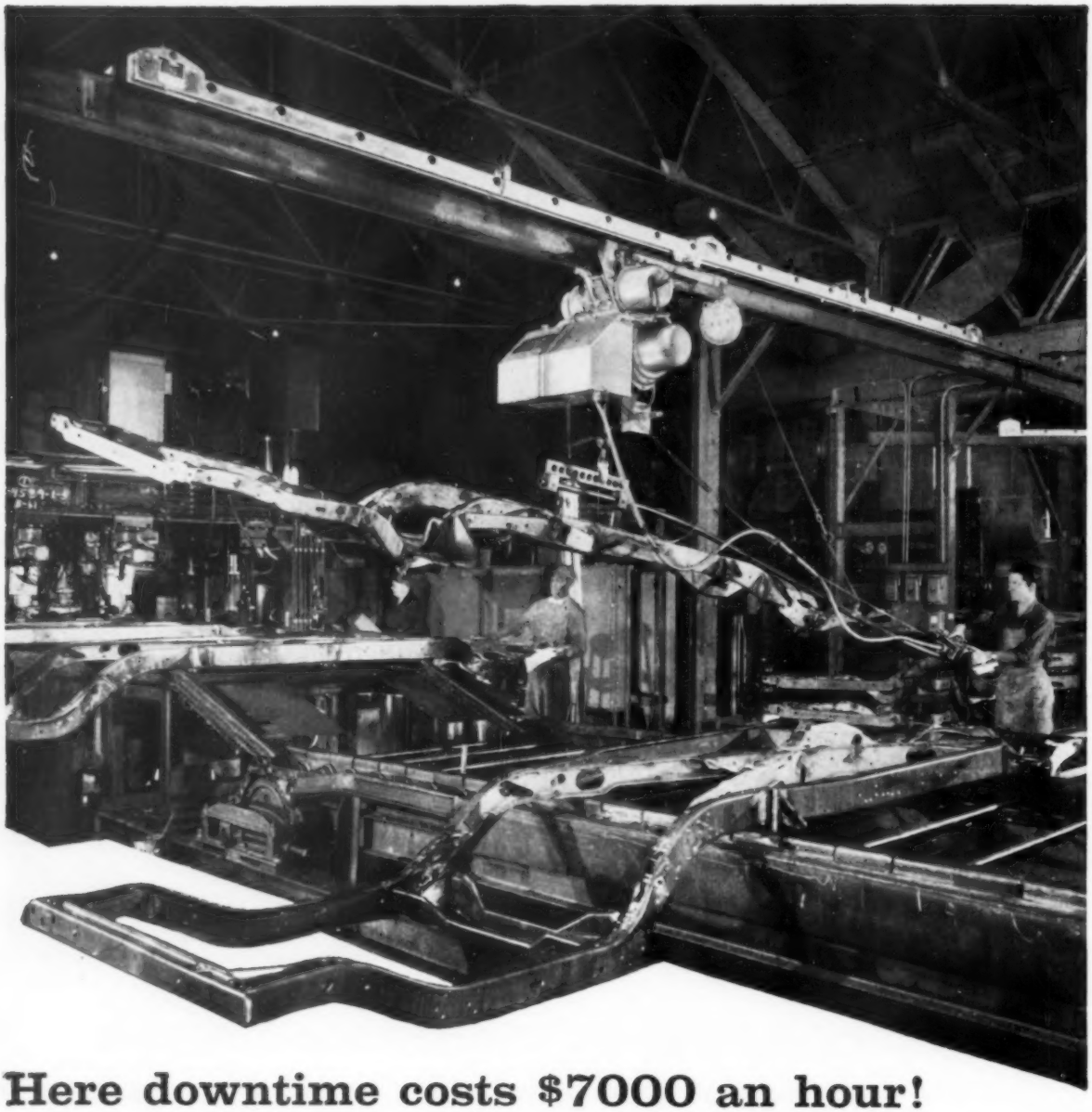
Eliminate vibration and noise. Pumps, compressors, engines, and pressure surges in pipe lines create vibration and objectionable noises. Garlock Rubber Expansion Joints act as an absorbent cushion . . . insulate against transfer of noise to other parts of the building.

These are only two of the many reasons why you should use Rubber Expansion Joints in piping systems for air conditioning, blower lines, brine tanks, jet condensers, pump lines, circulating water lines, etc. Write for Folder AD-137.

THE GARLOCK PACKING COMPANY
Palmyra, N. Y.

For Prompt Service, contact one of our 30 sales offices and warehouses throughout the U. S. and Canada.

For more facts circle 547 on Reply Card



Here downtime costs $7000 an hour!

...so A. O. Smith uses P&H HOISTS to help prevent shutdowns

The stakes are too high to chance a breakdown on this auto frame assembly line at A. O. Smith Corp., Milwaukee, Wis. A. O. Smith production men reduce the risk by using trolley-mounted P&H Hevi-Lift® Hoists, like the one shown above, for transfer operations.

A Hevi-Lift is virtually maintenance-free; P&H ingenuity has cut wear at the spot where more than half of hoist troubles occur — at the brake.

Only the Hevi-Lift has the new RCD brake. Of heavy-duty, mill-type construction RCD substitutes a gentle, but positive direct grip for the hammer action of old-fashioned brakes... It has fewer parts to break down.

This is just one way Hevi-Lift helps cut the high cost of downtime every day in many industries. Ask your P&H distributor for a demonstration of the P&H Hevi-Lift in action! Dept. 204C, Harnischfeger Corp., Milwaukee 46, Wisconsin.

HARNISCHFEGER

P&H ... quality and service for 74 years

For more facts circle 548 on Reply Card

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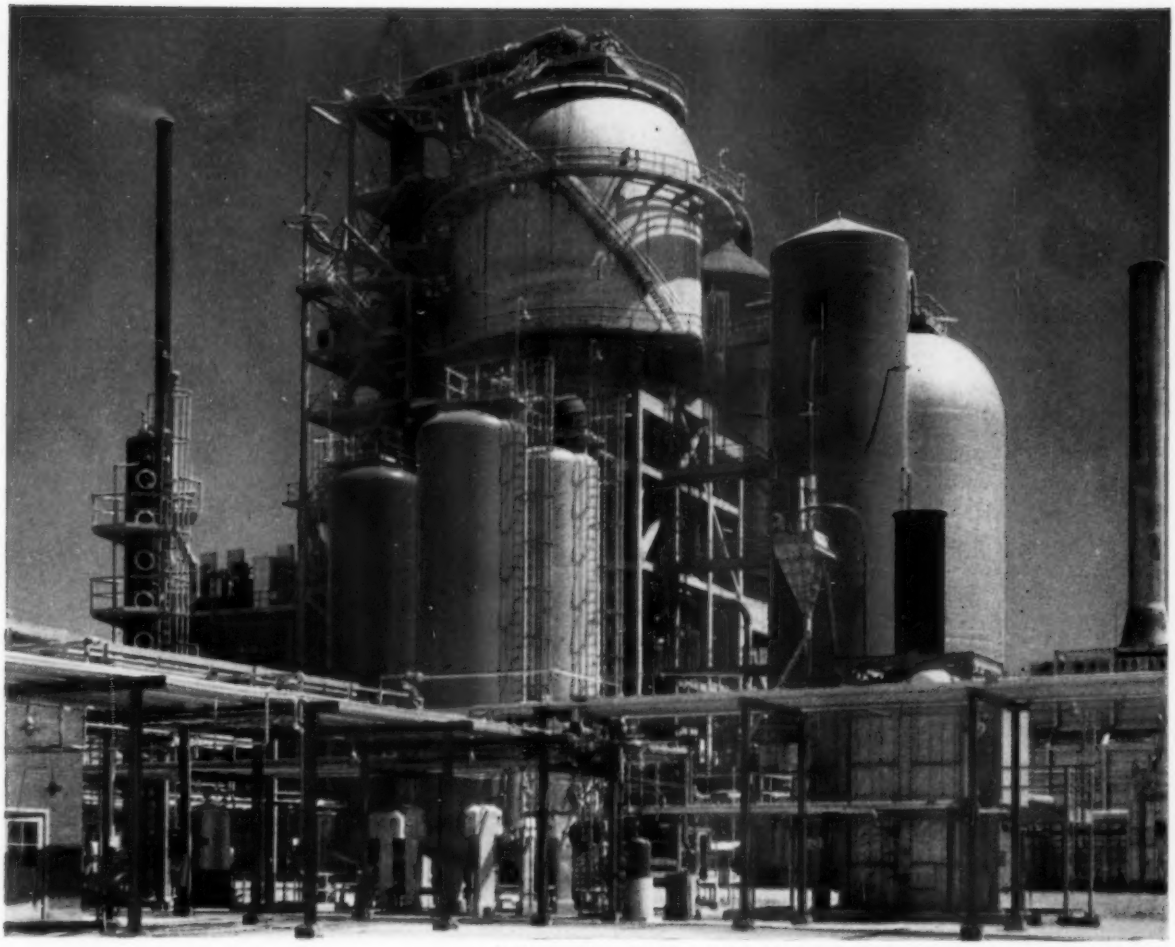


Phillips Petroleum Plant, Kansas City, Mo. Industrial painting by Stanley Hanks, St. Louis, Mo.

DO IT WITH COLORPOWER!

DU PONT PAINT PLAN ACCENTS YOUR PLANT'S BEST FEATURES

Strategic coloring can brighten community relations by transforming your plant into an area of visual interest. We call this "Focal-Point Painting." It's one way Du Pont Color Conditioning harnesses the power of color and puts it to work for you. "Focal-Point Painting" camouflages unattractive areas, improves community relations, boosts employee morale, and promotes efficiency and safety. We'll be glad to show how you can use this practical system profitably in your own operation—at no more cost than regular maintenance painting. Just mail the coupon below.

COLOR CONDITIONING PAINTS

DU PONT

REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

E. I. du Pont de Nemours & Co. (Inc.)
Finishes Division, Dept. PE-89, Wilmington 98, Delaware

Please send me the illustrated folder giving further details on Du Pont "Focal-Point Painting."

Name .....

Title .....

Address .....

City ..... State .....

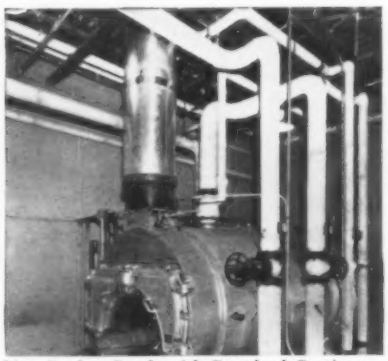
Low cost refractory stack outlasts steel

Low cost — The Van-Packer Industrial Stack is made of prefabricated sections for economy and easy installation. It costs no more than a steel stack, yet lasts substantially longer. Costs only a third as much as a brick stack.

Refractory construction — Van-Packer Stack sections are centrifugally-cast of refractory material that will not corrode. Three-foot long sections come in 7 diameters from 10-inch ID to 30-inch ID to meet your requirements.

Needs no maintenance — Sections of the Van-Packer Stack are cemented one on top of another with acidproof cement, and secured with aluminum drawbands. Sections have an aluminum outer jacket that requires no maintenance.

Available nationwide — The Van-Packer Stack is available through local Van-Packer Jobbers and Special Representatives. See "Chimneys — Prefabricated" in Yellow Pages, or write Van-Packer for Bulletin IS-32-58.



Van-Packer Stack with Standard Sections handles boilers and furnaces efficiently. Can be superimposed or floor supported.

Installing this stack is quick and easy. Three-foot sections are simply cemented atop one another with acidproof cement.

Van-Packer Stack with Hi-Temp Sections handles industrial incinerators with flue gas temperatures up to 2000° F.

Van-Packer PREFABRICATED REFRACTORY Stack

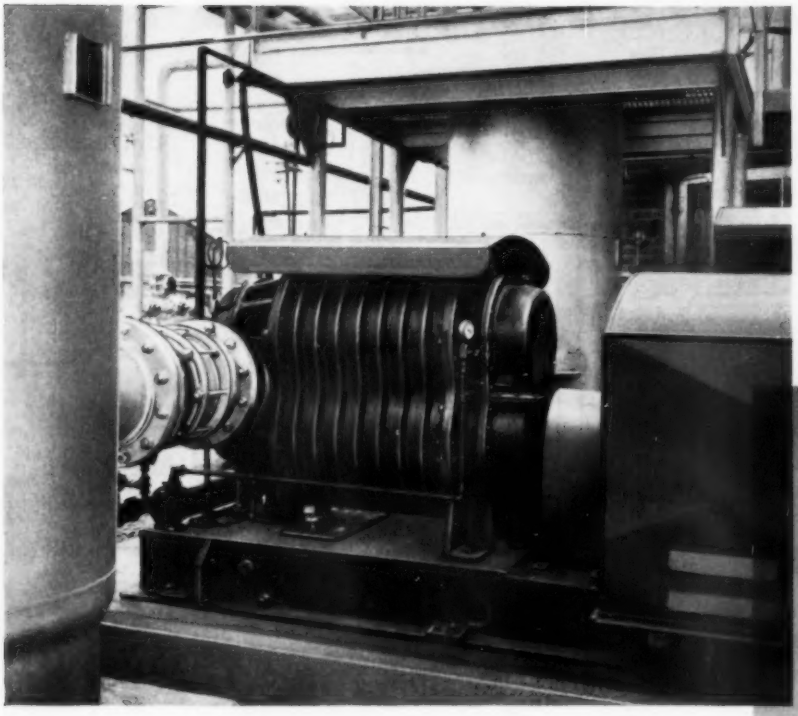
Van-Packer Company • Division of the Flintkote Company
P. O. Box No. 306, Bettendorf, Iowa • Phone: East Moline, Ill. 3-5288

see our catalog in Sweet's

For more facts circle 550 on Reply Card

AT KERR-McGEE OIL INDUSTRIES REFINERY

KERR-McGEE



14 x 27 Spiraxial Compressor delivers 3456 cfm at 28 psi discharge operating at 1800 RPM requiring 450 HP.

Sized for direct-connected drives with motors, engines or turbines, at speeds from 1,750 to 3,550 RPM.

•

Peak efficiencies at required discharge pressures.

•

Uncooled — requires no water jacketing.

•

No internal lubrication — delivers oil-free air.

•

Small space — low noise level.

•

Capacity ratings range from 700 cfm to 5,000 cfm, with pressures from 8 psi to 30 psi.

Rugged round-the-clock service without shutdown... thanks to R-C SPIRAXIAL® COMPRESSOR

The Cushing, Okla. Refinery of Kerr-McGee Oil Industries recently installed this 14 by 27 R-C Spiraxial Compressor and ran it for six months on a rugged 24 hour a day schedule—*without shut down or difficulties of any kind!*

The unit supplements the air supply to the regenerator and has helped increase throughput by 550 bbls. per day. Thus only a 1-year's run will pay for the installation!

Such sturdy, dollar-wise performance is typical of R-C Spiraxial units for refinery and many other types of service. Engineered with R-C patented Rotor Design, they insure greater efficiency, dependability and economy . . . require no water jacketing . . . reduce substantially both first cost *and* maintenance. Variable compression ratios widen the range of uses. Absence of internal lubrication assures oil-free air.

A product of progressive engineering, R-C Spiraxial Compressors are built to the same high standards of manufacture that have made Roots-Connersville the symbol of compressor dependability throughout the world.

ROOTS-CONNERSVILLE BLOWER

A DIVISION OF DRESSER INDUSTRIES, INC.

958 Power Ave., Connersville, Indiana. In Canada – 629 Adelaide St., W., Toronto, Ont.

For additional data, please refer to our section in **Chemical Engineering Catalog** or **Mechanical Catalog** or write for Bulletin LAL-458.

For more facts circle 551 on Reply Card

You can't "breathe new life" into old unit heaters...

don't repair . . . . .

1 Every heating season, thousands of old steam unit heaters develop leaks. And when a unit starts to leak it's almost a sure sign useful life is just about over. Repairs are usually a waste of time and money . . . it's economically wiser to replace.

2 In *time* alone, it costs from $25 to $300 (if scaffolding is required) to disconnect, take down and reinstall an "old-age" unit. Add the actual repairs — and the final cost is prohibitive. What's more, chances are additional leaks will soon crop up.

3 Unit heater failure is generally caused by internal or external corrosion. Sometimes it's due to improper venting or trapping. But even with careful maintenance, units eventually begin to show signs of wear, lose efficiency, develop leaks.

4 Because it's impossible to inspect the extent of corrosion within heating coil tubes, no one can predict where or when the next leak will occur. Repairs only prolong the unit's life for a *completely unpredictable* length of time.

In Canada: Sarco Canada, Ltd., Toronto 8, Ontario

. . replace with Modine

5 Service records show that most unit heater failures occur during coldest weather . . . often interrupt production at critical times. With a well-planned replacement program, failures are anticipated . . . units can be replaced in summer and early fall.

6 By replacing your old units with new Modines, you eliminate the danger of shutdowns and the expense of frequent (often useless) repairs. And you'll find that new Modines heat better, use less fuel, run quieter and require only routine maintenance.

New Modines are better than ever

New models, new features and nation-wide distributor stocks make this year's Modine line the best yet!

Take the new Modine Horizontal as an example. Motors consume less power. Sealed-in bearings end need for periodic lubrication. New vertical fins discourage accumulation of dirt and lint. And Modines are stronger, more durable . . . yet lightweight for easy installation.

FREE ON REQUEST — New 22" x 24" wall chart containing unit heater maintenance tips and a valuable performance check list. Also, Modine's new "Repair or Replace?" bulletin. Mail the coupon today!

20 POWER-THROWS

38 HORIZONTALS

48 VERTICALS

MODINE MANUFACTURING COMPANY
1563 DeKoven Ave., Racine, Wisconsin

I would like full information on replacement costs ☐; also wall chart and "Repair or Replace?" bulletin ☐.

Name .....
Firm .....
Address .....
.....

SU-1372

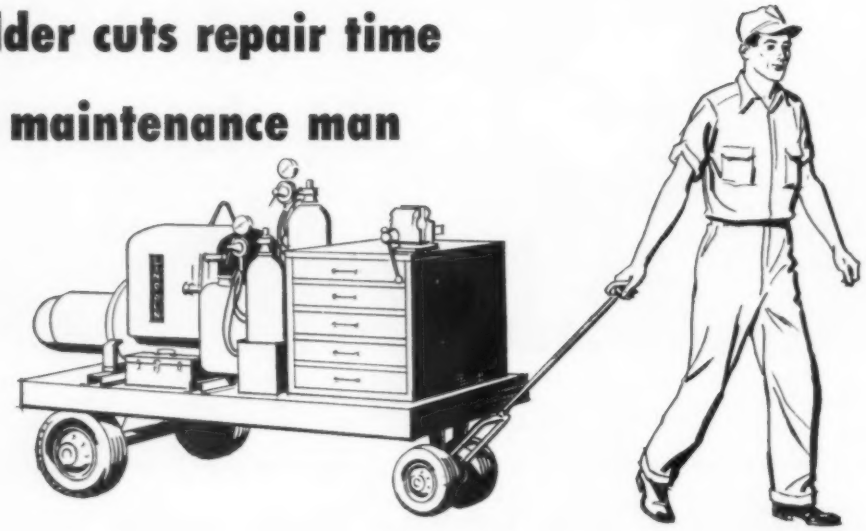
Modine
MANUFACTURING COMPANY

For more facts circle 552 on Reply Card

Weldynamics

ARC WELDING AT WORK CUTTING COSTS

Portable power generator and welder cuts repair time for maintenance man



A Lincoln Weldanpower mounted on a small hand-pulled truck with other tools and necessary equipment is the Weldynamic way to make a maintenance man a one-man repair department.

His shop is on wheels, easily pulled to the trouble spot . . . and when he gets there he has the power he needs.

There's no waiting for electricians, no searching for power outlets. Weldanpower furnishes 4KVA of 115/230 volt AC, 60 cycle power to operate tools and lights, and supplies 200 amp. AC welding current—both at the same time if necessary.

Maintenance man-hours will drop drastically when you powerize your maintenance man with Weldanpower. Write for Bulletin SB-1339.

The heart of your mobile maintenance shop—an engine-driven power plant, furnishes 4KVA of 115/230 volt AC, 60 cycle power and 200 amp. welding current.

The World's Largest Manufacturer of Arc Welding Equipment

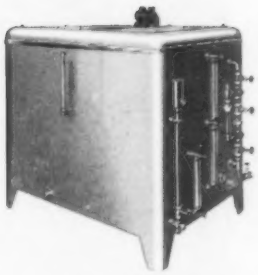
© 1958 The Lincoln Electric Company

THE LINCOLN ELECTRIC COMPANY, DEPT. 5004, CLEVELAND 17, OHIO

For more facts circle 553 on Reply Card

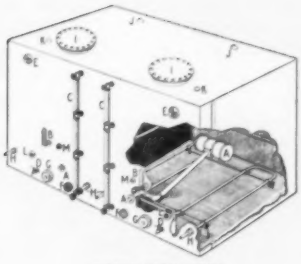
SPACE SAVING LUBRICATION SYSTEM

Figure 829 Self-Contained Lubricating Units offer a complete oil circulating and filtering system . . . compactly designed with filter, pumps, pressure tank, piping, alarms, gauges, etc.



OIL CONDITIONER

Figure 832-P — Filters and conditions turbine and other low viscosity, high demulsibility oils . . . without aeration, turbulence, heat or the use of moving parts.



RECEIVING AND STORAGE TANKS

Figure 363 — Two-Compartment Storage Tank permits precipitation of dirt and water from one batch while other batch circulates through system. Capacities 300 to 8,000 gallons.

Figure 360 — Receiving Tank receives dirty oil by gravity . . . precipitates dirt and water before pumping to filter. Capacities 100 to 6,000 gallons.

specify BOWSER

LUBRICATION & FILTRATION equipment

NOW!

"CUSTOM ENGINEER" your next lube system for big savings • unmatched performance . . . with this full line of advanced lubrication & filtration equipment! All sizes and capacities.

BOWSER INC. ESTABLISHED 1885

SALES AND SERVICE OFFICES: Albany • Atlanta • Boston • Buffalo • Chicago • Pittsburgh Cleveland • Dallas • Detroit • Fort Wayne • Houston • Kansas City • Los Angeles • Milwaukee Minneapolis • New Orleans • New York • Philadelphia • St. Louis • San Francisco • Seattle • Tulsa

Bowser cooperates by furnishing complete data for any specific installation or catalogs for engineering files . . . send coupon.

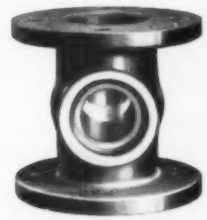
MAIL TO: Date _____

BOWSER, INC.
1300 E. Creighton Ave.
Fort Wayne, Indiana

Gentlemen: Please send prices and detailed information on:

- ☐ Figure 829 Lube System
- ☐ Figure 823 P Oil Conditioners
- ☐ Receiving & Storage Tanks
- ☐ Figure 818 Oiler
- ☐ Flow Sights
- ☐ Teleflow Indicator

(Attach to your letterhead for quick response.)



SIGHT FEED OILER

Figure 818 — Pressure-type oiler features location of indicator outside the liquid body making it ideal for use with dark liquids.

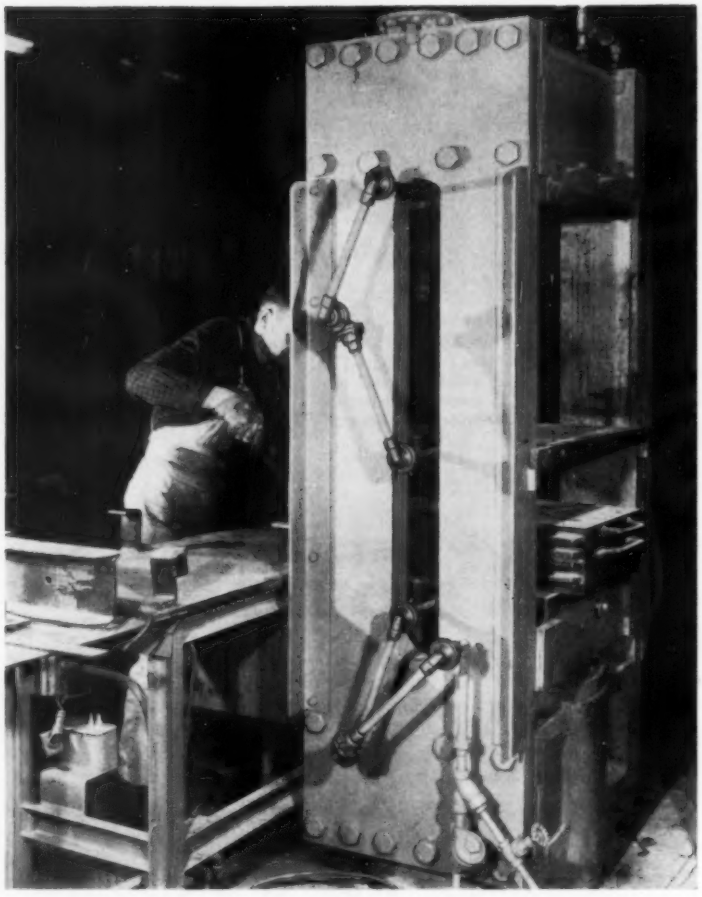
FLOW SIGHTS

Double window flow sights for vertical installation on gravity flow lines. Flow is clearly visible . . . glasses do not cloud.

TELEFLOW INDICATOR

Figure 815 offers easy reading graduated dial for close approximation of liquid in flow. Vane type indicators also available.

STEEL LINES FOLD LIKE AN ACCORDION
Typical of diverse swivel joint applications, newly designed Chiksan Discpak joints are installed on the steam lines of a platen press. This new type swivel joint, designed for hot gas and steam, allows inexpensive packing replacement without removing swivel joint from line.



WHEN *design*
DICTATES
METAL LINES . . .

SOLVE LINE FLEXING PROBLEMS

with **CHIKSAN SWIVEL**

Chiksan swivel joints allow metal lines to be flexed in predetermined travel arcs, eliminate hose rupture, reduce maintenance and replacement costs.

Where tight bends in pressure hose make wide loops necessary, Chiksan swivel joints, conversely, permit compact placement of lines. When used with hose, Chiksan swivel joints shorten hose lengths and also lengthen hose life by minimizing tight bend and torsional fatigue.

Chiksan swivel joints are available from stock in a wide range of materials, temperatures, and pressures to meet practically every design requirement. Chiksan swivel joint packing units are designed for specific services. For example, packings have been developed to efficiently handle non-inflammable hydraulic fluids. Write today for catalog and name of nearby sales engineer.

LONG SERVICE LIFE ➤
Chiksan swivel joints deliver years of service with only occasional maintenance attention. All-steel hydraulic lines on Flash-Butt welder, shown at right, allow lines to shift as machine is adjusted to handle various work.

A SUBSIDIARY OF FOOD MACHINERY AND CHEMICAL CORPORATION

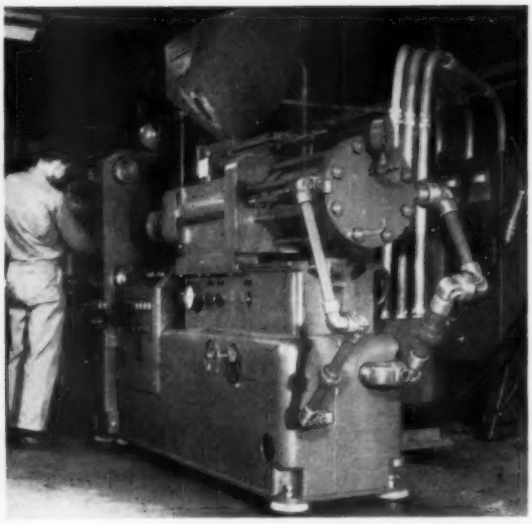
fmc CHIKSAN

CHIKSAN COMPANY—BREA, CALIFORNIA • CHICAGO 5, ILLINOIS • NEWARK 2, NEW JERSEY

Well Equipment Mfg. Corp. (Division), Houston 1, Texas • Subsidiaries: Chiksan Export Company • Chiksan of Canada Ltd.

NO HOSE BURST DANGER HERE...

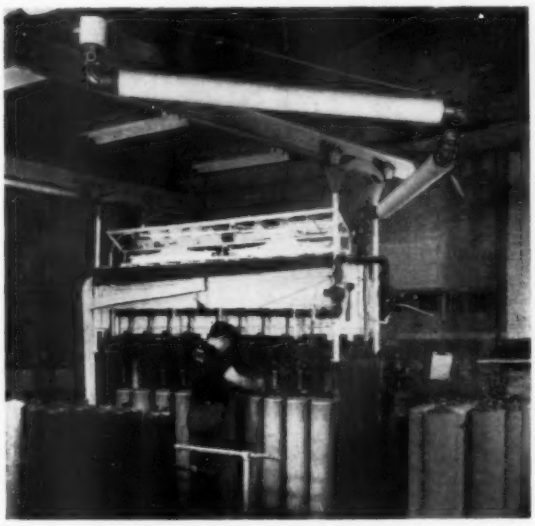
Critical lines take on a new measure of safety with all-steel flexible units replacing pressure hose. These all-metal swivel jointed lines shown on a die casting machine above, eliminate damaging hose ruptures, and reduce fire hazard, fluid loss and setup time by 75%.

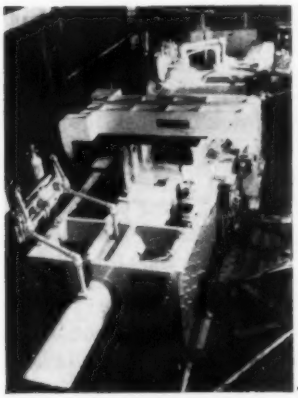


PRESSURE? TEMPERATURE? CHIKSAN MEETS THE NEED...

Over 2,000 different types, styles and sizes in a variety of temperature and pressure ratings are available to meet your design needs. This plastic injection molding machine, above, uses two different sizes of Chiksan swivel joints on its hydraulic lines.

JOINTS





NO LIMIT ON LINE DESIGN

Free swiveling action in 1, 2 and 3 planes permits design of compact lines to meet any requirement. This overhead line in service at a water softener regenerating plant permits shift from one setup of tanks to another for faster handling of tank regeneration.

#58-31

CHIKSAN COMPANY
330 NORTH POMONA AVENUE, BREA, CALIFORNIA

Please send me copy of your latest catalog

Name_____ Company_____

Title_____ Address_____

City_____ Zone_____ State_____

For more facts circle 555 on Reply Card

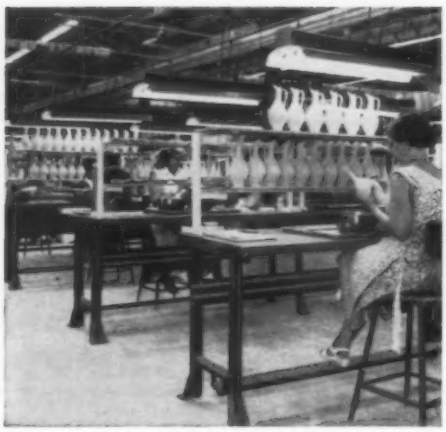
BASIC MODEL

Model 600

One bench top (steel, Presdwood-covered steel, ShopTop or laminated wood), two sturdy steel bench legs, and one bench stringer.

Space Engineering with Standard Units

is a cost-reducing advantage of all HALLOWELL Shop Equipment



Typical installation of HALLOWELL open type work benches. They can be set up in continuous line, back to back or individually as required.

Outfitting plant areas with specially designed and built shop equipment is a costly, time-consuming operation. And the equipment lacks the versatility to meet changing conditions. Space engineering with standard HALLOWELL Shop Equipment overcomes all these disadvantages. Its cost is only a fraction that of custom built units. It is carried in stock by leading shop equipment dealers, is easy to order—and deliveries are excellent. It is extremely versatile. Standard HALLOWELL interchangeable accessories (drawers, drawer tiers, end pieces, backboards, top and lower shelves, utility cabinets, storage wall units and electrical panels) can be added as needed to increase the usefulness of this equipment. Units can be rearranged to meet changing requirements.

Ask the authorized dealer nearest you for complete information on the standard HALLOWELL line of work benches, shop desks, stools and chairs, tool stands, cabinets, storage walls, and shelving. Or write Hallowell Shop Equipment Division, STANDARD PRESSED STEEL CO., Jenkintown 26, Pa.

SPS **Jenkintown • Pennsylvania**

Standard Pressed Steel Co. • The Cleveland Cap Screw Co. • Columbia Steel Equipment Co. • National Machine Products Co. • Nutt-Shel Co. • SPS Western • Standco Canada Ltd. • Unbrako Socket Screw Co., Ltd.

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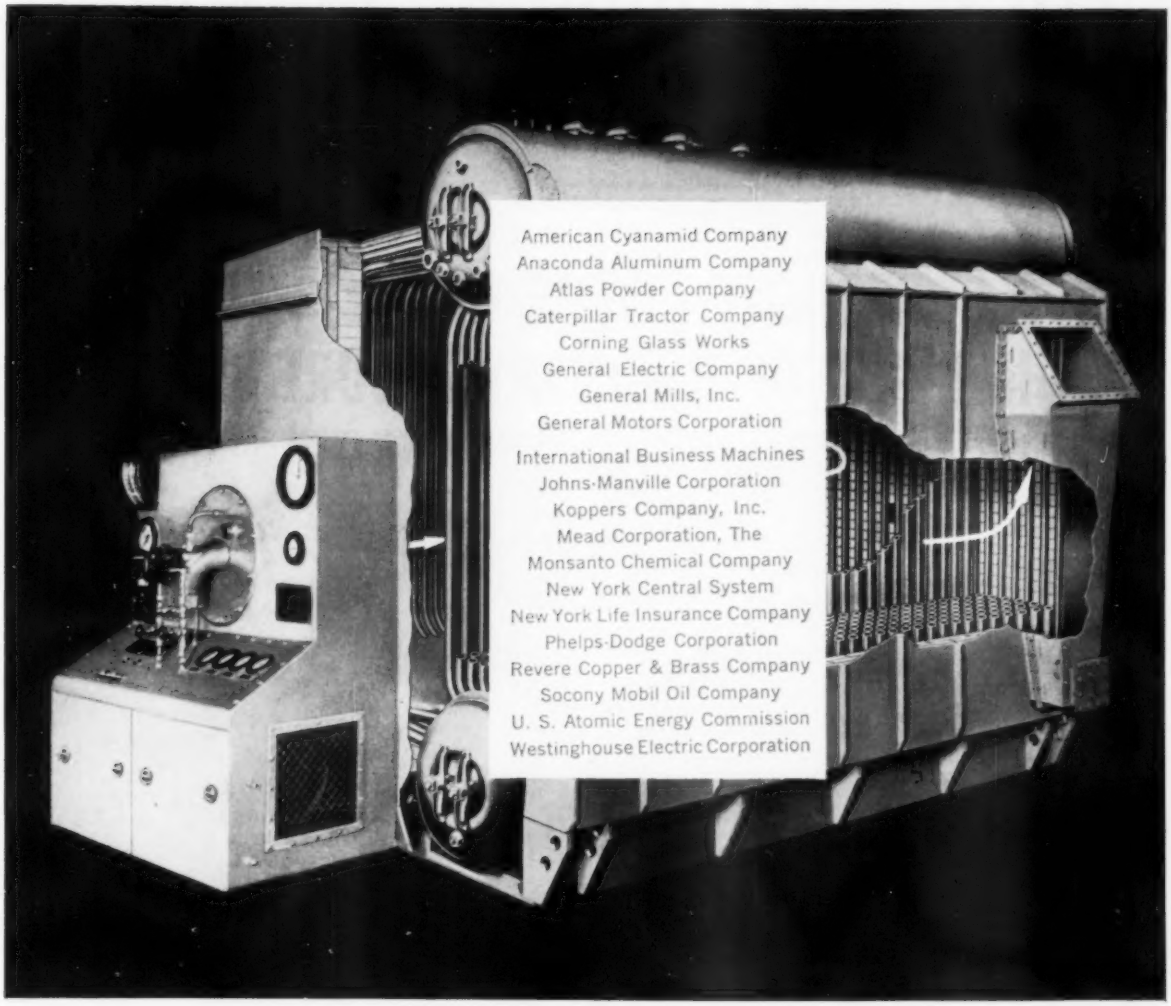


LEADING INDUSTRIALS CHOOSE THE VP

Not only do many of the nation's leading industrial companies – such as those listed above – buy VP Boilers, but also a long list of smaller companies and institutions have VP package boiler installations.

The choice of the "big" companies, however, has some special significance. They buy boilers frequently – therefore, their experience is always up to date. They buy them in all capacities large and small. Their requirements justify employment of highly qualified engineering specialists – both staff men and outside consultants. Thus, they have the breadth of experience and the expert guidance requisite to making the soundest equipment selections.

So – if you are in the market for boilers in the capacity range from 4,000 to 50,000 pounds of steam per hour, we submit that you can buy with confidence the boiler chosen by so many of the nation's largest industrialists – the C-E Package Boiler, Type VP. A new descriptive catalog, VP-3, is just off the press. Write for your copy.

COMBUSTION ENGINEERING

Combustion Engineering Building • 200 Madison Avenue, New York 16, N. Y.

C-1308

ALL TYPES OF STEAM GENERATING, FUEL BURNING AND RELATED EQUIPMENT; NUCLEAR REACTORS; PAPER MILL EQUIPMENT; PULVERIZERS; FLASH DRYING SYSTEMS; PRESSURE VESSELS; SOIL PIPE

For more facts circle 557 on Reply Card

NEW WESTINGHOUSE SUPER-HI™

FLUORESCENT LAMPS GIVE 2½ TIMES THE LIGHT OF ORDINARY FLUORESCENTS

REGULAR 40-WATT FLUORESCENT LAMPS in this manufacturing area provide only 21 foot-candles of illumination on work surfaces.

NEW SUPER-HI FLUORESCENT LAMPS installed in another part of the same manufacturing section put 55 foot-candles of light directly on work areas.

Westinghouse has developed a new Super-Hi fluorescent lamp that gives up to 2½ times as much light as regular fluorescent lamps . . . and nearly double the light of Hi-Output™ lamps. So now you can get much more light without increasing the number of fixtures. That means lower initial cost because you have fewer fixtures to buy . . . lower maintenance cost, too, because you have fewer fixtures to maintain. These powerful new lamps are ideal for medium and high bay industrial and outdoor lighting.

- **✓ Special cooling chambers maintain proper vapor pressure to give longer life . . . more light.**
- **✓ Longer life cathodes add to lamp life.**
- **✓ New Chromium-Vanadium plating on lead wires retards end-darkening.**
- **✓ Smooth slim design gives uninterrupted brightness all around the tube . . . much lighter weight for safe and easy handling.**
- **✓ Interchangeable . . . can be used in any fixtures designed for new extra Hi-Output lamps.**
- **✓ More reliable starting even in damp weather . . . special silicone coating over exterior surface of the lamp prevents collection of moisture.**

All Westinghouse fluorescent lamps have "Ultralume"™ phosphors to assure maximum brightness for the life of the lamp. There's one for every industrial, business and home use. Specify Westinghouse on every lamp order. Call your local authorized Westinghouse agent or write—Westinghouse Lamp Division, Bloomfield, N. J.

YOU CAN BE SURE...IF IT'S Westinghouse (W) FLUORESCENT LAMPS

For more facts circle 558 on Reply Card

COURT DECISIONS —a summary of legal findings of interest to the plant engineer

Prepared by Albert Woodruff Gray

Right To Work

IN A LAWSUIT against a labor union in Tennessee, a steel construction company charged that the union had called a strike on a construction job in that state and that although the union had agreed to furnish the union labor needed to complete the job, it had refused to do so, had refused work permits to nonunion workers and that the company, as a consequence, had been damaged $6000.

The union interposed the defense that this suit could not be maintained since the agreement which required the exclusive use of union labor was void and unenforceable under both the federal and Tennessee statutes.

Sustaining the decision of the lower court and holding this action could not be maintained, the Supreme Court of that state said of this Open Shop law: "We think the language proscribed the exclusive employment of either union or nonunion labor. If any contract either expressly or by clear inference undertakes to exclude the employment of either union or nonunion workers, it violates the public policy of this state. The courts cannot take notice of such contracts and thus permit them to be made the basis for the assertion of unlawful right and obligations.

"The statute is not confined to any contractual relationship between parties. It proclaims a settled policy that must be adhered to in the drafting of all future contracts involving the rights of employees and employers. Moreover, by any reasonable interpretation of the statute, all workers should have an equal protection of the law." Court brief 308 S.W.2d 381.

Sales Talk

ACTION WAS BROUGHT by a Pennsylvania dealer against the manufacturer of heating equipment for damages for what was claimed to be fraudulent misrepresentations contained not only in the catalog and pamphlets of the manufacturer but in advertisements appearing in magazines and elsewhere.

In a denial of a recovery by this distributor, the court said, "A careful examination of the matter contained in the advertising does not disclose any statement of fact upon which an action for deceit can be founded. It is elementary that mere commendatory statements, called 'dealers' talk' or 'trade talk' are not actionable because these are generally regarded as mere expressions of opinion not likely to be very strongly relied upon, especially where the parties deal upon equal terms.

"I am of the opinion that the general commendatory statements in the advertising matter were not such representations as would form the basis for action. The cases in which the purchaser is justified in relying upon such expressions of opinion and might bring action if deceived by it, are generally cases in which the parties are not dealing upon equal terms. In this case, the purchaser's officers were experts in the business." Court brief 12 F.S.979.

Price Cutting

IN AN APPEAL before the United States courts, a Pacific coast wholesaler had been sued in 15 separate actions for cutting prices in the Los Angeles, California, area, while at the same time maintaining its former price schedule outside that area.

The companies bringing these actions contended that this wholesaler had discriminated in these higher prices outside that area with the intention of injuring competition. Sustaining the dismissal of these suits by the lower court, it was said by the federal appellate court of price cutting of this character:

"The implication of the argument of these companies is that prices can never be lowered by a concern which does any interstate business in one area if it fails to make a corresponding cut in every locality where it does business.

"It may be said, Congress did not put a floor under all existing prices so these could never be lowered by a firm doing interstate business. Such a situation would not be in the public interest. The people are interested in obtaining goods at the lowest price possible if competition is not vitally affected thereby. The assumption suggested would ring the death knell of competition." Court brief 231 Fed. 2d 356.

Cost of Installation

IN THE specifications of a contract for the installation of a ventilating system in the construction of a municipal auditorium in New Orleans, it was provided:

"In each of the fan rooms, it is required at times to use all fresh air, all recirculating air, or a mixture. This contractor is to furnish and install proper Johnson Service Co. or equal hand control dampers where marked and of a type that can be locked in any position they are set so that the right mixture of air can be obtained."

When the subcontractor sought to install dampers manufactured by itself which it maintained were "equal" to the Johnson dampers, the general contractor refused acceptance and deducted from the money due this materialman the cost of the installation of the specified dampers.

The court said, in the interpretation of the "or equal" clause: "When the general contractor was apprised of the subcontractor's intention not to install Johnson dampers, but those of its own design and construction, the contractor was within its rights in objecting and insisting that the dampers specified by the materialman in its bid, and had been approved by the architect, be used." Court brief 152 So. 809.

Ownership of Invention

SUIT WAS brought by a can manufacturer against its plant manager to determine the ownership of an invention of a "reusable can" used by the United States Ordnance Department.

This employee had been instrumental in securing government contracts for the manufacturer of cans of this type. In the course of his

COURT DECISIONS

work of supervising the performance of government contracts, he conceived the idea of this reusable can, that could replace the can specified in the government contracts. Having conceived and developed this discovery while performing his work as manager for the can company, he secured the necessary drawings and applied, in his own name, for a patent which a year later was granted.

Aroused by the commercial success of the invention, the manufacturer claimed ownership on the ground that the invention had been conceived and perfected by the employee on the time and with the facilities of this manufacturer. The court said, of the duties of the inventor as an employee: "He had not been employed either as a professional engineer or inventor but solely as superintendent or manager of the plant for which he was hired.

"Merely because he had been an employee of the manufacturer did not confer by that fact an ownership in the invention that was the outcome of his 'flash of genius' for which this manufacturer had contributed only the material and means for its development." Court brief 153 NYS 2nd 768, N. Y.

Catalog Warranties

IN A LAWSUIT brought for damages for breach of a warranty of the durability of a steam heating boiler, the purchaser asserted that the manufacturer's salesman gave him a copy of the manufacturer's pamphlet and warranted the boiler to last a lifetime and that it was everything claimed for it in the booklet. On the other hand, the salesman contended he had warranted only the capacity but not the durability of the boiler. Further, that he had no authority to warrant that feature.

Contained in the pamphlet under the head "Requirements of a Good Steam Heating Boiler," was the statement, "It should be durable in construction and not liable to require early repairs."

When the appellate court sustained the judgment against the manufacturer, it said, "The manifest purpose of the manufacturers in advertising durability as one of the qualities of their boilers, was to recommend them to the purchaser.

"The fact that they furnished this purchaser, through the salesman, a copy of their pamphlet is evidence from which his authority to warrant the durability might be inferred. No reason appears why the line of his authority should be drawn at capacity or why he should be authorized to say in effect to purchasers, 'Some of these representations are true. As to others I am not permitted to speak.' The representations of the manufacturers contained in their pamphlet and distributed by their salesman, are as binding upon them as though orally made by them to the purchaser or included in the bill of sale." Court brief 5 Atl. 711.

Competitive Bidding

SPECIFICATIONS for the construction of a gravel filter well unit stated: "The work to be done includes the construction of a gravel filter, well unit, Layne type or equal, complete with pumping equipment and auxiliary engine drive having a guaranteed minimum capacity of not less than 700 gpm against a surface pressure of not in excess of 25 ft, all as hereinafter specified."

Taxpayers sought a review of this invitation for bids, contending that the specifications precluded any bid except by the company named. In its interpretation here of the phrase as it was used in this instance, the New Jersey Supreme Court said:

"It would seem that a careful reading of the above quoted portion of the specifications does not preclude competitive bidding. Albeit, specifications call for a 'Layne type' gravel filter well unit; provision is therein made for other types of equipment by the use of the words 'or equal.' To hold otherwise would be to do violence to plain and simple English." Court brief 53 Atl. 2d 210, New Jersey.

"Or Equal" Clause

LAWSUIT INVOLVING a construction contract in Seattle, Washington, specified: "All sidewalk lights to be 3 by 3 in. reflecting prism lens set in cement; all frames to be what is known as bar-lock construction. All joints must be made and guaranteed water tight. These lights shall be of the W. B. Jackson make or equal, and shall be constructed to carry a safe load of 350 psf."

It was further provided that the work be performed to the satisfaction of the architect named, who had the right under the contract to approve or reject the work. A materialman wished to install lights which he insisted were the equal of those named in the specifications.

When the architect flatly refused even to consider a substitution, the contractor installed the lights specified in the contract at a cost of $600 over those suggested, then sued to recover that amount.

In its decision, sustaining the contention that under this "or equal" clause the materialman was justified in making the substitution of the lights, and that the owner was liable for the additional expense, the Washington Supreme Court said:

"Manifestly the materialman was given the option either to put in the W. B. Jackson lights or lights equal to these lights; and this being so, the installation of either would be a compliance with the contract." Court brief 95 Pac. 640.

Purchase Price Recovery

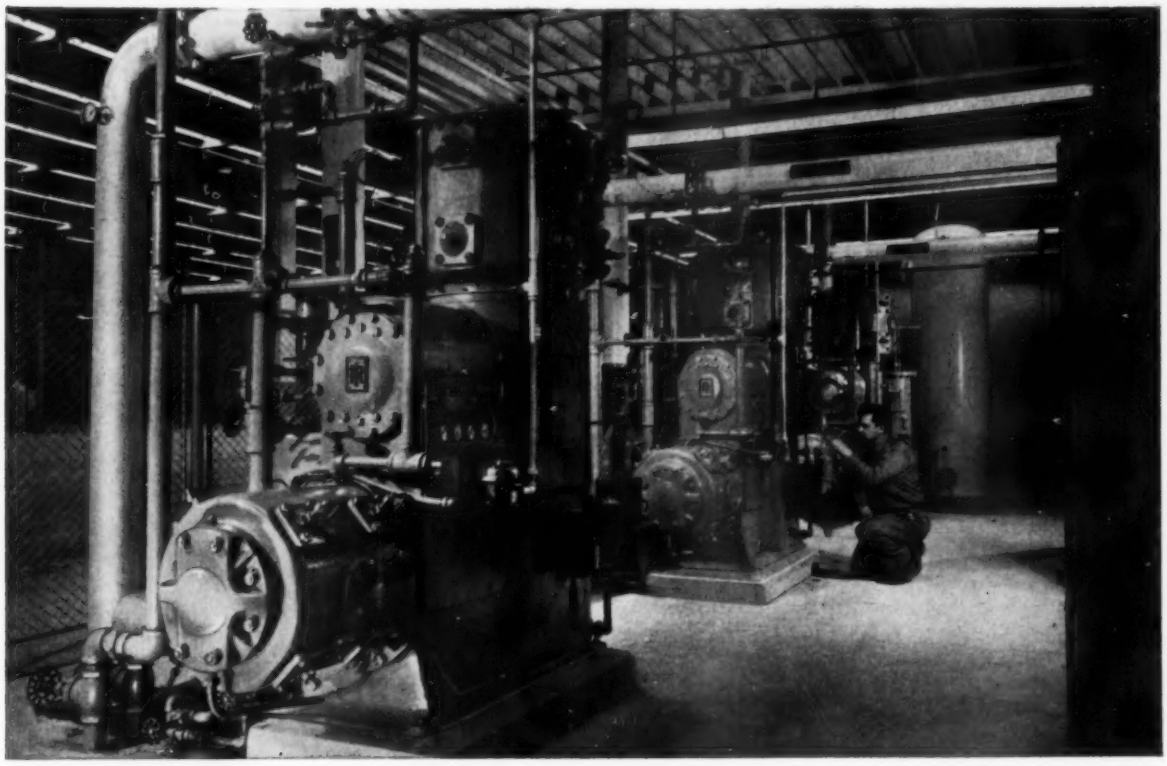
SUIT WAS brought in New Hampshire to recover the purchase price of a warm air furnace. When the equipment had been installed, the buyer had given the dealer in payment, his note for $454.16 and had made two payments of $12.62 each.

In action brought by the buyer against the seller, it was asserted that the furnace had failed to work properly from the time it had been installed and that repeated requests had been made that it be removed.

"The Uniform Sales Act," said the court in sustaining the purchaser's contention, "gives the buyer of goods the right to rescind the sale and obtain restitution for the amount paid the seller on the ground of breach of warranty. Furnaces and heating equipment are goods within the meaning of the Uniform Sales Act and are governed by its provisions.

"Where, as in the present case, rescission takes place after acceptance, the buyer must return or offer to return the goods to the seller in substantially as good condition as they were in at the time the property was transferred to the buyer." Court brief 135 A.2d 716.

FOR SUPERSONIC AIR POWER



Ingersoll-Rand XLE compressors provide dependable plant air for North American Aviation—specialists in supersonic flight

At North American Aviation's Los Angeles (Calif.) Division—where tomorrow's supersonic flight is being developed today—these three Ingersoll-Rand XLE compressors are on duty around the clock, providing a never-failing supply of air power.

These modern packaged-design compressors save valuable floor space and are shipped fully-assembled, ready to install on a simple foundation. "Thru-frame" air flow eliminates interstage piping. Full-floating aluminum bearings are foolproof—sealed crankcase never needs to be opened for bearing adjustment, so dirt (the major cause of wear) is kept out of the oil. All moving parts are pressure-lubricated. Push-button starting and simplified operation are standard, and fully-automatic or remote controls can be supplied if desired.

These XLE compressors are built in sizes from 125 to 350 hp—other Ingersoll-Rand compressors are available from ½ to 6000 hp. Contact your I-R representative for help with your compressor problems.

AIR-CUSHIONED IR CHANNEL VALVES CUT DOWN-TIME

The heart of any compressor is its valving . . . Cut valve replacement and you've solved the No. 1 compressor maintenance problem. Ingersoll-Rand Channel Valves do just that. They are known the world over for remarkable durability, high efficiency and quiet operation. They are entirely different from any others—each valve is a combination of straight-lifting stainless-steel channels and leaf springs, with trapped-air spaces which cushion action and prevent impact. And only I-R compressors have Channel Valves.

Ingersoll-Rand

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COMPRESSORS • GAS & DIESEL ENGINES • PUMPS • AIR & ELECTRIC TOOLS • CONDENSERS • VACUUM EQUIPMENT • ROCK DRILLS

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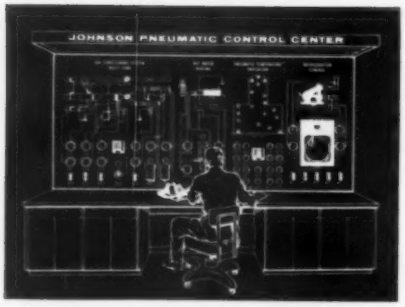


PNEUMATIC TRANSMISSION

Pneumatics simplifies and improves centralized control of Air Conditioning— makes Control Centers easier to understand and operate

With pneumatic transmission by Johnson you get the benefits of control center instrumentation that is as simple and trouble-free as the pneumatic controls used elsewhere in the building!

Thanks to universal familiarity with pneumatic controls, operating personnel easily become expert in the operation of even the largest pneumatic control centers. No highly specialized training or extensive study is required.

Since pneumatic transmission functions with both fewer and simpler components, there are no complex, costly upkeep problems.

CONTINUOUS INDICATION

Pneumatic transmission offers other exclusive advantages that add greatly to ease of operation and efficiency of centralized control.

For example, only the pneumatic control center gives the operator *continuous* indication of key temperatures. With a separate pneumatic thermometer for each key point, he can check the entire system with a single glance. There are no buttons to push, no waiting for periodic logging, no codes to check.

NO SIDE EFFECTS

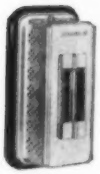
Likewise exclusive are control pressure gages that allow the operator to observe the operation and position of controlled devices at remote points. And, of course, only pneumatic systems are immune to the effects of humidities, temperatures, transient electrical currents, voltage fluctuations and other outside variables. This assures the extreme accuracy necessary for continuous, precision control.

CHOICE OF FEATURES

The use of pneumatic transmission for the centralized control of air conditioning and heating systems allows complete flexibility in the choice of control features. The Johnson line includes a wide selection of remote indicating, recording and controlling instruments, some of which are shown on the opposite page.

Pneumatic transmission as applied by Johnson offers you the same exclusive combination of accuracy, simplicity and superior performance that have long made pneumatic temperature control systems the standard everywhere. A nearby Johnson engineer will gladly give you more facts about these and other advantages of pneumatic control centers.

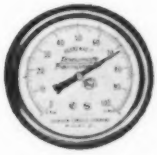
Johnson offers you Control Center instrumentation to meet the exact requirements of the individual installation



T-1210 Room Transmitter. Transmits space temperature to Control Center. Has highly sensitive, low-mass bi-metal measuring element. Temperature range is 50 F.

T-1220 Transmitter. Measures temperature in ducts, pipes, tanks, and other remote locations. Compensated, liquid filled measuring element. Ranges of 100 and 200 F available.

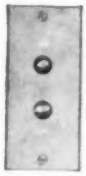
T-1270 Receiver Controller. Receives measurements from transmitter and either (1) controls directly, (2) resets remote submaster controllers or (3) acts as a remotely reset submaster to control as in (1) or (2).



T-1250 Pneumatic Thermometer. For remote indication of temperature as measured by transmitter. Available in a wide variety of sizes and ranges, with Fahrenheit or Centigrade scales.

G-201 Control Pressure Gage. Provides continuous remote indication of the operation of the controllers and position of controlled devices. An invaluable aid to operation.

S-222 Pneumatic Gradual Switch. Permits manual readjustment of the set point of remotely located instruments from the Control Center. Small, highly accurate, trouble-free.



Pneumatic Push-Button Switch. May be used to start and stop fans, pumps and other electrical devices or to position any control device or equipment requiring two-position manual switching.

T-1000 Recorder-Controller. Furnished with powerful, high-accuracy measuring elements for temperature, pressure or relative humidity control applications. One-pen and two-pen models available.

Target Gage. Used in conjuction with Pneumatic Push-Button Switches to indicate operation of electrical equipment. Equipped with high visibility red or green fluorescent segments.

Miniature Indicating Controller. Conserves space on panels without sacrificing quality of control. A wide variety of easy to read scales and charts are available.

Miniature Recorder-Controller. Plug-in type, completely interchangeable with Miniature Indicating Controllers. For temperature or pressure control applications.

T-1050 Indicating Controller. For temperature, pressure or relative humidity applications not requiring a chart record. Master and submaster models available.

JOHNSON CONTROL

PNEUMATIC SYSTEMS

DESIGN • MANUFACTURE • INSTALLATION • SINCE 1885

JOHNSON SERVICE COMPANY
Milwaukee 1, Wisconsin

Please send Johnson Control Center Booklet S-103

Name & Title_____

Firm_____

Address_____

City & State_____

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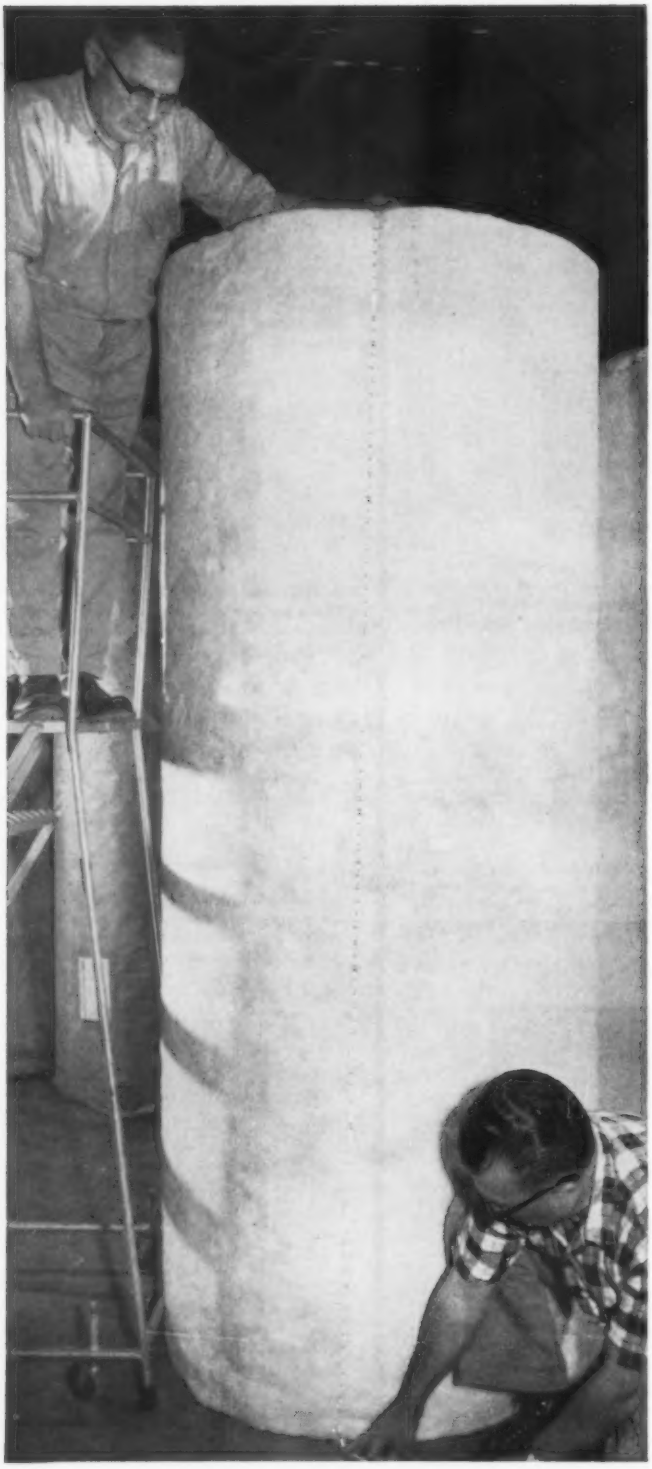

NOW!

You can get Pittsburgh Superfine Insulation in one-piece 84″ and 96″ widths

Trailer and mobile home manufacturers can now save installation time with these new "jumbo" one-piece widths of Superfine Fiber Glass Blanket Insulation, available only from PPG. There are less individual pieces required, fewer cuttings and piecings. The new 84″ and 96″ widths can be ordered plain or with any of a variety of standard facings.

Pittsburgh Superfine is easily handled, rot-proof, fire-resistant. It's the finest insulation against heat, cold or road noise you can buy! For complete information, write *Pittsburgh Plate Glass Company, Fiber Glass Division, One Gateway Center, Pittsburgh 22, Pennsylvania.*

PITTSBURGH SUPERFINE IS A PRODUCT OF THE FIBER GLASS DIVISION OF PITTSBURGH PLATE GLASS COMPANY

Sales Offices are located in the following cities: Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, Minneapolis, New York, Philadelphia, Pittsburgh and St. Louis

75th ANNIVERSARY 1883—1958 PPG

SYMBOL OF SERVICE FOR SEVENTY-FIVE YEARS

PITTSBURGH PLATE GLASS COMPANY

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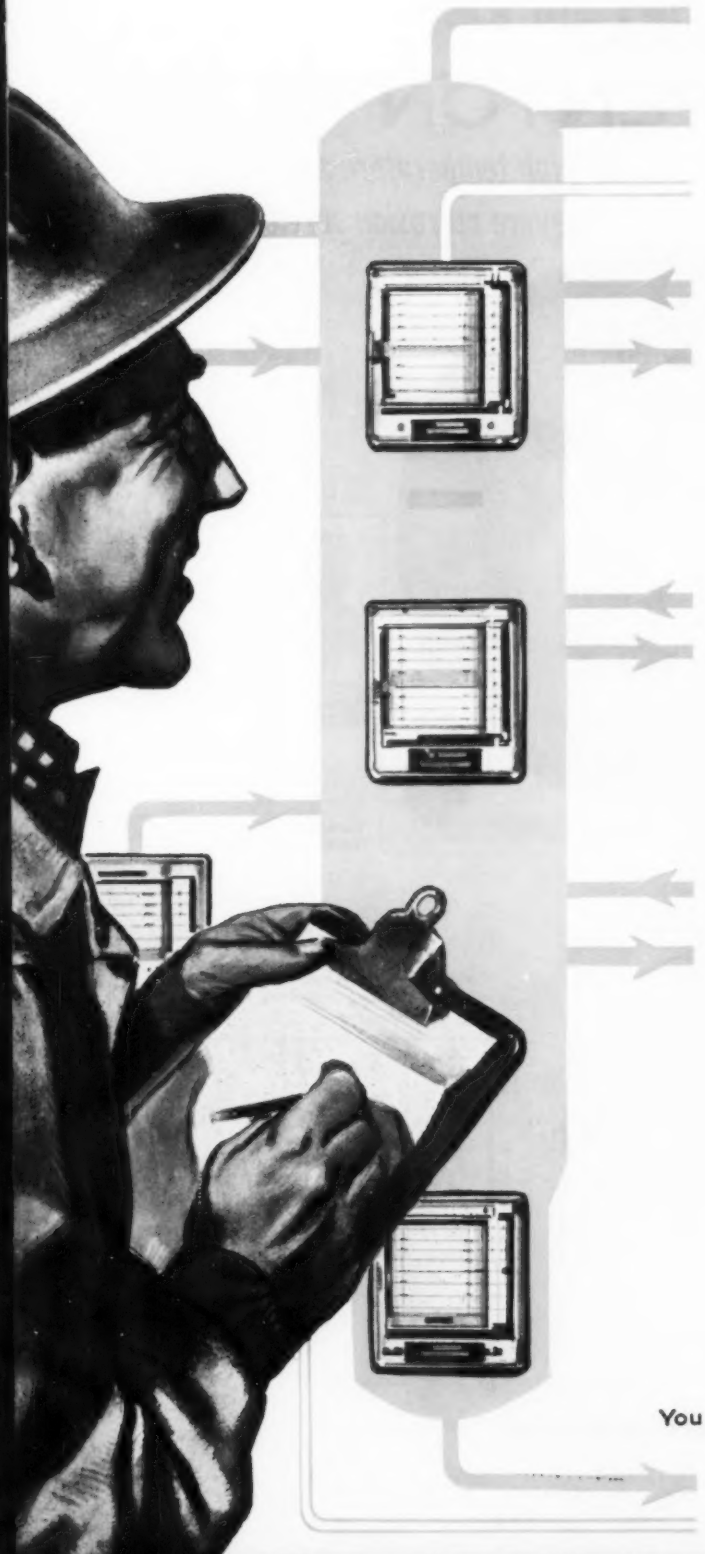
Nothing gets by

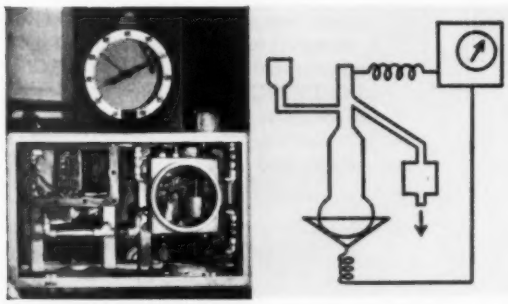
Automatic end-point testing device developed by Standard Oil research men makes certain of the uniform quality of gasoline and diesel fuel delivered to you.



Scientists at Standard Oil never stop in their drive to improve and then improve again the uniform quality of the petroleum products that bear the Standard Oil trade-mark. These engineering research scientists have now created wholly new instruments for performing near continuous physical analysis *automatically*.

One such instrument automatically performs the physical analysis that determines end-point. Using it, refineries maintain a continuous inspection of the temperature at which gasoline and diesel fuels are completely distilled. To you, this means that Standard is able to maintain a constant control over the uniformity and high quality of (1) the fuels you burn for heat or use to power your diesel engines and (2) the gasoline for your truck and passenger car fleets. It also means that Standard Oil power- and heat-producing petroleum products, with their constantly controlled end-point, burn uniformly, give you uniform high performance.

This is part of the research pay-out, the "something more" research builds into the products you buy from Standard. This is your return from Standard's investment in research. And now there are 48 district offices in the 15 Midwest and Rocky Mountain states to serve you. Call the one nearest you. **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**



Automatic end-point tester works this way. A small sample is placed in an electrically heated flask. The temperature is measured and recorded during a heating cycle when distillation is accomplished. Distillate is condensed and drained, the flask temperature is lowered by introduction of the next sample, and the apparatus is ready for another test.

You expect more from STANDARD and get it!

For more facts circle 562 on Reply Card

CHEMTROL

recommends

PENTON®

for high temperature and severe corrosion services --

BALL VALVE

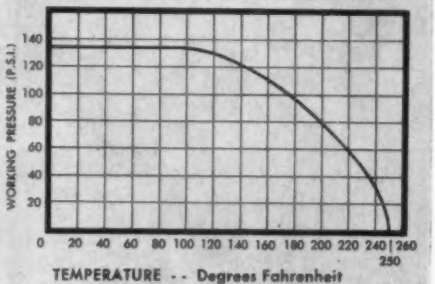
Micro-Meter
NEEDLE VALVE

Micro-Flow
GLOBE VALVE

CHEMTROL, leading manufacturer of plastic valves, has proved PENTON to be the ideal material to withstand the most severe service requirements of industry. PENTON complements CHEMTROL'S complete line of materials for corrosion-service plastic valves. These include the Globe and Needle valve series (⅛ in. and ¼ in.) as well as the Ball valve series (½ in to 4 in.).

Distributor Stocks Nationally

CHEMTROL VALVES Pressure vs. Temperature
Maximum Operating Allowable for PENTON
including a factor of safety for dependable service.



HERCULES POWDER CO. TRADEMARK ®

chemtrol

CHEMTROL

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FOR CORROSION RESISTANCE AT ELEVATED TEMPERATURES

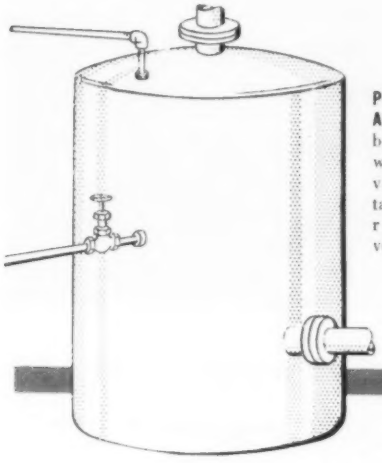
check the Penton* package

A completely new thermoplastic with a broad spectrum of corrosion resistance, Penton may well supply the answer to some of your toughest corrosion problems —particularly at elevated temperatures.

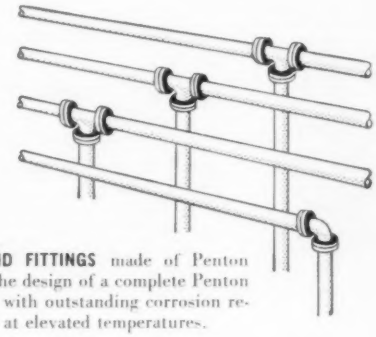
The unique combination of mechanical and chemical-resistant properties found in Penton, combined with the ease and economy with which it can be fabricated, makes this new material ideal for the production of anti-corrosive equipment in many forms. Although new as a commercial product, Penton has been thoroughly evaluated and its usefulness proven in many tough corrosive exposures even at temperatures exceeding 300°F.

Check the advantages of the proved-in-use Penton package for complete processing systems. Valves, pipe and fittings, pumps and meters, flame-sprayed or whirl-sintered metal parts—all are now available for immediate use offering the extra protection of Penton. We'll be glad to put process equipment users in touch with a manufacturer who now offers Penton products.

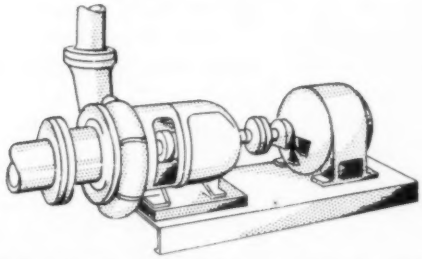
Whether you are a user or manufacturer of processing equipment you'll want to know more about Penton. Write for a copy of "The ABC's of Penton for Corrosion Resistance" or the technical brochure designed for equipment manufacturers.



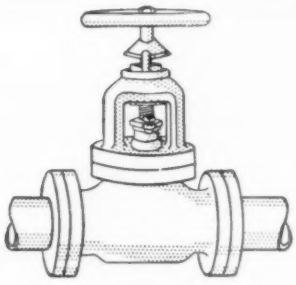
PENTON COATINGS AND LININGS applied by flame-spray or whirl-sintering convert ordinary metal tanks into highly corrosion-resistant vessels.



PIPE AND FITTINGS made of Penton enable the design of a complete Penton package with outstanding corrosion resistance at elevated temperatures.



PUMP AND METER PARTS molded with Penton or made with Penton-clad metal extend the usefulness of this new plastic in processing systems.



PENTON VALVES of many types, solid or lined, can now be obtained in sizes up to 6 in., meet many service needs previously requiring higher-priced glass or metal alloy parts.

Cellulose Products Department

HERCULES POWDER COMPANY

INCORPORATED

900 Market Street, Wilmington 99, Delaware

C958-6

*Hercules Registered Trademark for Chlorinated Polyether

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In zero weather this warehouse was heated at a monthly cost of less than a penny per square foot

During last January's sub-zero weather, Dravo *Counterflo* heaters maintained a comfort-heat level of 68° in this 79,000 square foot warehouse—and at a fuel cost of only seven-tenths of a cent per square foot for the month.

Recently erected for C. A. Turner Inc., Rankin, Pa., the insulated industrial supply warehouse, with high roof areas and large access doors for truck and rail shipments, is heated by just three 500,000 Btu/hr and one 750,000 Btu/hr gas-fired heaters.

The Dravo "blanket-of-air" method of circulation is particularly effective in large, hard-to-heat areas. Based on high velocity discharge of warm air above the working zone and low velocity return at floor level, this system reduces heat-loss to the roof. Warm air is pulled down to the work area by the return of cool air to the heater. A Dravo heating engineer will be glad to explain the application of this money-saving principle to your particular heating problem.

Bulletin 564, describing the complete line of Dravo *Counterflo* heaters, is available. Write Dravo Corporation, Dravo Building, Pittsburgh 22, Pa.

DRAVO
CORPORATION

Blast furnace blowers • boiler and power plants • bridge sub-structures • cab conditioners • docks and unloaders • dredging • fabricated piping foundations • gantry and floating cranes • gas and oil pumping stations • locks and dams • ore and coal bridges • process equipment • pumphouses and intakes • river sand and gravel • sintering plants • slopes, shafts, tunnels • space heaters • steel grating • towboats, barges, river transportation

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WHAT'S JUST AHEAD IN THIS ISSUE?

- WHILE MANY of the situations and problems encountered by Installation Engineers in the United States Air Force, stationed in what has become our 49th state, are similar to those encountered by plant engineers, stateside, many are vastly different. We think you will be interested in an editor's report on USAF installations in Alaska, beginning on page 98.

- "COST CONTROL in Maintenance" tells you how one successful plant engineer is controlling his costs of basic organization, work requests, labor expenditures, etc. Read the article starting on page 104.

- GOT A WELL that isn't well? Then call in the strobe light cameraman. He can probe your deep well's innards like a surgeon looking through a tracheoscope. To see what the camera has done, read the article on page 108.

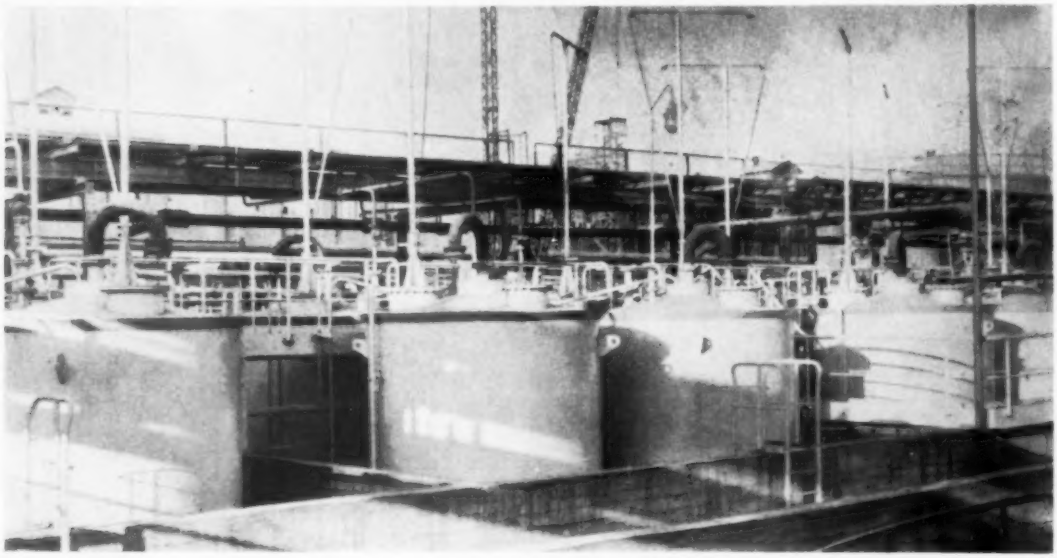
- OF INDUSTRIAL food service equipment and areas it could be said, "It isn't the original cost, it's the upkeep." In the article on page 118 the author shows how to plan for low upkeep and continuous service.

- WHAT IS interrupting capacity and what can it do for your plant? Comparing an irrigation system to an electrical distribution hook-up helps explain it. To see how it can protect your equipment, turn to page 122.

- DO YOU WONDER if all the machines and equipment in your plant have been lubricated properly and on schedule? If you have any doubts, we suggest you look at "Coded Lubrication Systems" which starts on page 126.

- HOW DO YOU go about selecting a steam trap to handle condensate from a heating system? One way is to note the factors that pertain to the job at hand and apply them in equations. Another is to use a chart or nomogram and streamline the procedure by applying the pertinent factors directly. Such a nomogram appears on page 129 and is a handy tool for steam trap selection.

These organic solvents storage tanks are sprinkled with water to lower the temperature. In addition they are located in highly corrosive atmosphere. Photos show tanks after 6 months' exposure in this highly corrosive atmosphere following painting with urethane coatings; there is no corrosion.



Study of URETHANE COATINGS Under Tough Corrosion Conditions

PRESENT AND POTENTIAL uses for urethane surface coatings is a subject of growing interest among corrosion and maintenance engineers. While urethane coatings are relatively new to the United States, seven years of extensive field application experience in Germany and over two years of active development here in the United States has provided much useful data for evaluating the performance of urethane coatings.

Urethane coatings are made from polyisocyanate and hydroxyl bearing resins which include polyester resins. One of these, called Mondur CB, is a newly developed non-irritating, non-toxic product described as being safe for use under any normal application conditions. They are made by Mobay Chemical Co., Pittsburgh.

Coatings produced from Mondur CB and polyester resins are the foundation of urethane coatings which are described as possessing the following properties:

- Corrosion resistance
- Chemical, solvent and water resistance
- Toughness with flexibility
- Durability to high temperatures
- Abrasion, impact resistance
- High gloss
- High dielectric strength
- High hardness

Heat and Chemical Resistance

One of the sites of urethane coatings application is a large steel mill in the Rühr, which has used over 125 metric tons of isocyanate coatings during the past three years. One of the properties of urethane coatings which had not been fully appreciated heretofore, but which was demonstrated at this steel mill, is their excellent heat resistance.

At this location, half of the blast furnace equipment, the coke gas distribution system and heat treating equipment throughout the plant had been coated with isocyanate paints. The remaining half of the steel structure had been coated with another paint.

The coke gas distribution system includes large duct pipework, compressors and gas coolers. One of these units was a giant gas holder which had been coated with isocyanate paint, as were

shells of heat treating ovens where forgings are preheated.

During the visit, it was noticed that heat and fumes of the forging operation had severely attacked the non-urethane coatings, leaving the surfaces rough and quite dirty. The surfaces coated with urethane paints, however, were still clean and glossy.

In this project, the urethane paints had been applied in the following sequence: first, the metal had been cleaned and a chromate wash primer was applied. A coat of isocyanate primer came next, followed by two coats of conventional pigmented isocyanate paint. The total film thickness of the three coats was approximately four to five mils. (For most applications, however, a thickness of one mil per coat has been found to be adequate.)

Corrosion Resistance

There are numerous instances where these coatings have been used in highly corrosive atmospheres. At one rubber accelerator plant, for example, urethane coatings were being exposed to the hot fumes of hydrogen sulfide, amines, and strong hydrochloric acid with no harmful effects noted up to that time.

It was pointed out that isocyanate-coated conveyor systems, used for handling abrasive and corrosive materials, were also withstanding the ravages of corrosive wear to a remarkable degree.

Abrasion Resistance

The concrete floors, metal walkways and laboratory areas of a research laboratory of a large chemical company in the Midwest were coated with a gray urethane enamel system. This paint has been in service for over sixteen months and in areas of heavy traffic has performed exceptionally well. The floors do not soil readily and are easily cleaned.

They have been found to be especially suited to concrete floors in plants. In one test site, 3000 sq ft of fresh concrete floor area was coated in a cigarette plant. In another, 10,000 sq ft of wooden floor surface was coated with urethane varnish in the machine rooms of an optical company. Thus far, these floor finishes have shown high resistance to scuffing, scratching, impact and abrasive wear.

Grease Resistance

Isocyanate coatings have excellent resistance to fats and oils. This fact was demonstrated in a European plant which produces fatty alcohols. Steel tanks with 12-20,000 liter capacity were coated on the inside with four coats of urethane lacquers and baked with infrared rays. Molten fatty alcohols are held in these tanks at temperatures as high as 130 C, with no destructive effect on the coating after repeated exposures.

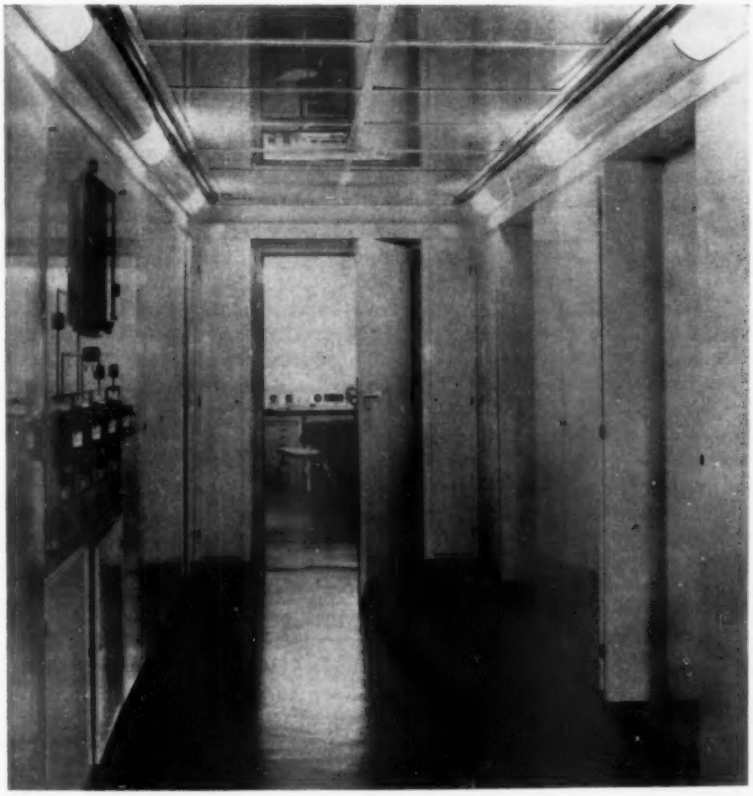
Similar coatings have been widely used in German slaughter houses, dairies, breweries and other installations where ease of cleaning and sanitation are important. Their grease resistance makes them specially valuable in slaughter houses and dairies.

Moisture Resistance

Urethane coatings are reported to have shown excellent resistance to hot, moist conditions. One test site in Germany was a wood kiln, built with concrete walls and a wooden ceiling 100 feet long with 10-foot cross sections. Wood stacked on cars is placed in the kiln for drying and the atmosphere is vari-cycled from high moisture at high temperature to dry heat. In addition to heat and steam, traces of wood distillation products are in the air at all times during the curing phase. The concrete, wood ceiling and floor of the kiln were coated with isocyanate paints and showed no signs of deterioration after 2½ years of constant service.

The isocyanate component is described as a non-toxic, non-irritating product which can be safely handled and applied under normal conditions. Precautions which are normally taken in the handling of paint solvents are all that are required. **End**

Corridor in chemical plant where walls and floors were finished with urethane. High gloss on floor following year's exposure to heavy traffic show urethane's resistance to abrasion. The floors do not soil easily and they are cleaned readily.



MAINTENANCE MEASUREMENT—
It Can Be Made To Work
It Will Save Money

BUT...

By BURKE W. WOMBACHER, Plant Engineering Consultant, Redondo Beach, Calif.

THE EFFECTIVENESS and value of maintenance work measurement is still highly controversial. Many companies have adopted a system of standards or a partial system to measure their maintenance workers' output. These companies are, however, still in the minority, probably amounting to about 15 per cent. Others have tried, but later abandoned, such a system.

Maintenance work measurement is still a "hard-sell" item that promises only intangible savings and benefits. In this respect the selling problem is almost identical with the old problem of selling a preventive maintenance program.

There is a major difference however; the plant engineer and maintenance supervisor have always helped to sell preventive maintenance. Very few will try to sell work measurement. Thus the proponent, for example, a maintenance superintendent, must first sell the plant engineer. He, in turn, must sell general management. It is a toss-up as to which is the hardest nut to crack.

My answer as to whether such systems will work and effect savings is always "Yes, but . . . ." I know that maintenance measurement can be made to work, but . . . with certain reservations and qualifications attached to my "yes" answer.

It was about 1946 that I first remember meeting with the idea of maintenance work measurement. A magazine article had come to our plant manager's attention and he approached me on the subject. I was the maintenance superintendent and it must be confessed that I was unreceptive to say the least. I still remember voicing what I thought were original comments:

"You can't apply standards to such a varied and non-repetitive type of work."

"I'm an on-the-job supervisor and I know that I'm getting all the work possible out of the men."

"The cost and trouble of developing standards and making them work would far offset any possible gains that could be made in output."

You've probably heard these comments dozens of times too, and know they are not completely true.

While I was on this job nothing was ever done to measure maintenance output. However, in later jobs I saw the light and got into step with this growing trend. Here are some of the pros and cons of what I have learned:

What It Is

Maintenance work measurement means the application of time standards data to measure the output or productivity of maintenance workers.

These standards are full time and motion studies similar to those used for repetitive production operations. They do not even resemble other types of maintenance standards such as the meaningless "ratio-standards" which allow X-number of maintenance hours per 1000 production hours or units; nor the "estimate" system based on statistics from historical records; nor "work-sampling" methods, etc.

The end result of the time standards data system of measurement is a black and white common denominator measurement that is really understandable by both management and labor. It then becomes a useful tool for many purposes. It is useful for talking about performance, costs, budgets, goals and many other things.

What the "Pros" Say About It

Here is what the proponents mainly claim will result from a maintenance work measurement system.

1. It is universally agreed that the average efficiency of maintenance departments is 40 to 50 per cent. With standards applied, this efficiency will rise to 65 to 75 per cent the first year, and then rise to 80 to 90 per cent in ensuing years.

2. The installation of a work measurement system may cost up to 10 per cent of the total maintenance payroll the first year, but it will be reduced to less than 5 per cent or less in the ensuing years. This cost will quickly be offset by an almost immediate improvement in efficiency that will allow up to a 50 per cent reduction in size of your maintenance force.

3. Work measurement is a system that quickly spots the drones and loafers in a group so that they can be improved or weeded out. What's more, the rest of the group will be spurred to better their efforts. In case you have a union, then figures resulting from the system will be factual proof that will justify the supervisor's actions.

4. The system will relieve the foreman of his planning and scheduling and estimating duties, thereby allowing him more time for on-the-job supervision.

5. Other claims of benefits briefly are:

   a. Improves job planning and scheduling and thereby reduces overtime.

   b. Makes possible closer project estimating, furnishes a check to evaluate contractor bids, and spots excessive job costs.

   c. Points up delay times so that they can be studied and reduced through better equipment, methods, etc.

   d. Helps justify better equipment by showing possible reductions and savings of manpower.

What the "Cons" Say About It

The cons have strong voluble arguments that are hard to fight. Also, they tend to voice their arguments so loudly and violently that they can overwhelm the pros who are trying to patiently do a selling job of promises and intangibles.

Here are some stock "con" answers to the foregoing "pro" items.

1. It is only an estimate or guess that says maintenance efficiencies average 40 to 50 per cent. No doubt after standards have been applied, it can be shown that efficiency has "increased" to 70 to 75 per cent, but comparing an "after" figure to a "before" guess is meaningless. It is just as readily conceivable that the "before" percentage was already 80 per cent and the standards only helped to slow down output.

2. Almost any plant engineer or maintenance foreman will tell you that he is always overloaded with work, and shorthanded. If there is 10 per cent that can be added to the payroll, he will surely welcome more workers with open arms, but not more paper-pushers.

3. Any good on-the-job supervisor already knows his men and their efficiency thoroughly, and he will be quick to spot anyone that isn't pulling hard on his oar. Union or not, figures or none, you can be sure that he'll take action to weed out any deadwood. He has to, if only to make his own job easier by getting the work done properly.

4. A maintenance foreman is already conditioned and trained to cope with his existing duties of planning, scheduling and estimating, but what will happen in the case of a sharp economic cut-back?—the less essential paper-pushers would be the first to go and this would leave the foreman stuck with so much new paper work, he would probably never get out on the job again.

5. All of the claims made for the work measurement system are only promises and intangibles, and there is not a single concrete guarantee that such a system is going to be anything except a lot of trouble and expense.

Guides To a Decision

A little study of the pros and cons foregoing make it clear why there is still so much controversy, and why a decision to establish work measurement in maintenance is so difficult.

To try to sell such a system against opposition or to get cooperation after selling it against opposition is a tough road and not worth the effort. Such a system should only be initiated from or with the full cooperation of that portion of the management team that must make it work—plant engineering and maintenance. Many have tried to do otherwise and failed.

Here are some guides to help you determine if you want or need work measurement in your particular plant.

1. Be objective in your thinking. You should do a real honest soul-searching job of mentally evaluating your maintenance efficiency. Is it really good in the 75 to 80 per cent range, or is it truthfully pretty poor at about 30 to 40 per cent?

Remember that the 40 to 50 per cent average that the experts talk about is just that—an average. This means that there exists a wide range of efficiencies from about 30 to 90 per cent to get an average, and that it is recognized that some of the most efficient do not use time standards data.

2. If your maintenance efficiency rates low, then you must consider another critical factor. Unless you have more than 50 maintenance workers excluding guards, janitors, clerical and the like, then the time standards data system is generally con-

sidered by many authorities to be economically impractical for your use.

If you have less than the 50, it does not mean that you should not measure, but that you should do so more simply.

It is not hard to establish times for all of your routine and repetitive jobs, and by applying work simplification methods to your initial times, you will find that there will be rewarding savings on man-hours, and improvements in equipment and methods. Also you will find that men in general will welcome some system of measurement and that their pride will spur them to try to beat the times you set if the times are realistic.

Let the Workers Set the Times

In one of my jobs I let the men set all of the times initially. In almost every instance these times were later reduced through experience and improved methods and equipment, largely through the efforts and help of the men. As to a true drone or loafer, I don't believe I have ever known one.

3. Maintenance measurement by time standards data works, but—it isn't automatic; it must be made to work. Establishing time standards isn't a simple thing to do, it's a real big job. Also it is a job that will never be finished because you will be forever after setting new standards, and revising the old ones because of methods improvements, etc.

Trying to establish standards from the ground up is not only terrifically tedious and costly, but it is unnecessary. The best and cheapest way is to engage the services of a management consultant firm that has an industrial engineer specializing in this work. They will be able to furnish you right away with a set of predetermined standards for all of the common crafts. Most of these you will be able to use at once with a little tailoring to suit some aspects of your work.

4. Remember that you will need at least two and better three people for this job at the start; a standards administrator or supervisor, a standards checker for on-the-job planning and checking, and desirably a good clerk-typist.

Here is an excellent spot for a young industrial engineer to get some valuable experience, or a spot to train some good potential maintenance supervisors.

Anticipate that these people will require about two weeks full time training and an additional two weeks of part time training by your consultant, before they become effective. If the people have had some previous time and motion study experience, then the training times can be slightly reduced.

Be sure to pick people who will be good for the long pull if you can, preferably some who could fall back into your ranks for a time, so that during a recession you wouldn't lose their costly talents because of a temporary business lull.

Yes, maintenance measurement works, but it is not a cure-all. It cannot be recommended for all plants any more than a doctor can recommend a single medicine for every ailment. Only by a very thorough study of a maintenance organization can the need be determined.

As one of the guides to decision, I mentioned 50 people as being a dividing point on crew size, only because this seems to be the opinion of most experts. Personally, I believe that 100 is a better figure, unless there is a preponderance of people in just one or two trades, such as mostly pipefitters and electricians with just a sampling of other crafts.

In making an evaluation of maintenance to determine what is necessary to improve efficiency, you should also recognize that there are certain things that are not generally mentioned that maintenance work measurement does not do:—

1. It does not substitute for good supervision. There is no substitute for good supervision.
2. It does nothing to encourage quality work, only quantity.
3. It does not help in the training of workers.
4. It does not guarantee good job planning, scheduling, or engineering.
5. It does not spur the worker to willingly better his efforts, unless some sort of incentive is offered in addition.

Yes, maintenance measurement works; I know it works, but—it is a special tool designed to do a particular job and may not be the tool you need. However if your evaluation leaves you doubtful—try it!

Many have tried the system of standards data and later abandoned it; others use it and claim as much as a 3 to 1 return—$3.00 savings for every dollar spent on working standards.

In general it appears that the ratio of savings is directly proportionate to the size of the plant and the size of the maintenance work force; the larger the plant and the larger the work force, the more standards are needed and the greater the area of application and the greater the resultant benefits and savings. **End**

"Who put the algaecide pills in the aspirin tablet bottle?"

Low power base station unit, below, covers entire 300,000 sq ft area with ease. Foreman dispatches trucks to move heavy dies, right, or handle payload both ways. Lower right, one box is delivered and another box of parts is removed for the fitting department.

Two Problems—One Answer: TWO-WAY RADIO

By TOM McRAE, Lennox Industries, Marshalltown, Iowa

IN OUR MAIN Marshalltown, Iowa, plant the layout of the facility and the processes involved in manufacture of home heating and air conditioning units created two problems for our five vehicle lift truck fleet.

First, we were not obtaining full utilization of our equipment and second, truck traffic, though comparatively slight, had become a safety problem.

With the installation of a two-way radio system we are able to operate with only three trucks—increasing efficiency and cutting traffic 40 per cent.

Our 300,000-sq ft plant consists of five buildings, each housing a major department—shipping and receiving; heavy metal fabricating; light metal fabricating (2); and fitting.

The general foreman of each department had been assigned one lift truck and operator to take care of materials handling functions of the department.

Basically, these would consist of setting heavy dies in fabricating presses, bringing required metal stock to these presses, removing filled pallet boxes of stamped parts to storage areas, and taking boxes from storage areas to fitting lines as required for various production runs.

Two Trouble Spots

Movement of component parts in a furnace plant and keeping production lines well stocked is quite a job because extreme bulkiness of the products and their parts necessitates location of storage areas a great distance from the lines. The multiplicity of furnace models also means frequent changing of production runs and parts.

Our old system worked well, with two exceptions:

1. Spot checks showed that while all materials handling work was being performed, the trucks were idle about 30 per cent of the time. Yet peak periods indicated a need for more trucks. Furthermore most trips were productive one-way only with many runs between the buildings made empty handed.

2. Passageways and aisles in our older building were not designed to accommodate the traffic of five lift trucks as well as pedestrians. Many office doors opened directly onto the aisles and into the paths of the vehicles. A reduction in traffic was required.

Peak period needs, however, had prompted several foremen to ask for additional trucks. We felt this would only add to the two problems already present, so we decided to experiment instead with a central radio dispatch system for controlling the vehicles.

Consequently, we installed a Motorola Dispatcher two-way radio system, with radiophones on three of the trucks and a base

(Continued on page 216)

Preventive Maintenance—Alaska Style

It's Rough Going, but Alaskan Air Command Is USAF Champion

Installations Engineers of the Alaskan Air Command have one of the world's toughest preventive maintenance jobs. They are doing it so well that in 1957 they won the USAF preventive maintenance trophy. This is the first of two articles which describe some of their everyday problems and the system which helps cope with them

By MARJORIE E. WEISSMAN, Associate Editor, Plant Engineering

IN ALASKA, land of contradictions, where sometimes the ground must be refrigerated north of the Arctic Circle; where cold-storage units must be heated; and where, amid ice and snow, fire is one of the greatest hazards, the United States Air Force has been extraordinarily successful in coping with some of the most difficult climatic conditions to be found anywhere.

Especially outstanding is the record of the Alaskan Air Command in preventive maintenance. Proof? In 1956, the USAF preventive maintenance trophy for the best overseas command was earned by the Alaskan Air Command for the "highest rate of implementation of organization and management of preventive maintenance." And then for 1957, the Alaskan Air Command went on to win the trophy for the "best command worldwide."

Credit for these awards goes to Colonel Donald F. Lehnhard, Deputy Chief of Staff, Installations; to the engineers and administrative staff of the Maintenance Directorate, headed by Major Raymond E. Larson; to Captain Joseph D. Maher, Jr., in charge of the Directorate's Preventive Maintenance Division and to the

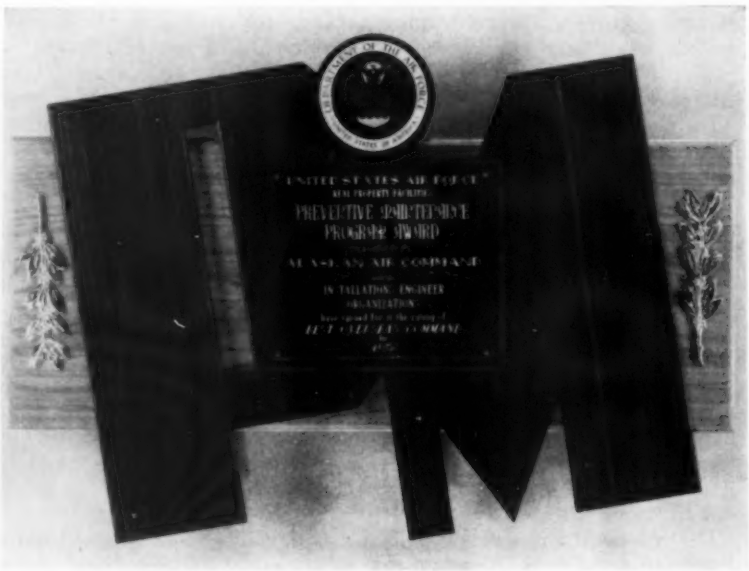


Fig. 1. Preventive maintenance trophy presented to best overseas command in 1956, is similar to that awarded to AAC for best worldwide rating in 1957. Other trophies are presented to the best maintained bases and sites by AAC.

officers and men of the installations organization of the Alaskan Air Command bases and remote stations.

Most of the men responsible for preventive maintenance have their own philosophy about it. Ernie Ogden, preventive maintenance division chief at Elmendorf, explains his this way: "We try to concentrate as many adjustments as possible into each scheduled PM visit to reduce potential outages. Preventive maintenance schedules are carefully and thoroughly planned to avoid scattered, 'bird-seed' type of maintenance."

One hundred thirty miles south of the Arctic Circle, at Ladd AFB which experiences some of the most extreme temperatures and weather in the Territory, the Installations Engineer, Lt. Col. Carl O. Brasier, is proud of the preventive maintenance job done by his department. Ladd, originally a Cold Weather Test Station, has grown to a full-size operational base. Because the original station was built inside a bend of the Chena River, and bounded on the opposite side by parallel runways, little room was left for expansion. As a result, new facilities had to be constructed on the opposite side of the runways creating a "twin" base.

According to this Installations Engineer, good preventive maintenance is a matter of attitude. "Attitude both makes and solves many maintenance problems. Just about anything that can be done at any other base, can be done here."

In more remote sites, north of the Arctic Circle, the same pride and care goes into the work. Installations Engineer, Lt. Charles Burgess is responsible for preventive maintenance at Cape Lisburne ACW Station. The excellent job he has done in maintaining an "older" station has been recognized by the award of the 1957 Preventive Maintenance Trophy from the Alaskan Air Command. In addition, Lt. Burgess received an official commendation.

Big Country, Big Job

Let's take a look at what the Air Force responsibilities encompass in this spectacular country of mountain ranges, fertile valleys and boggy tundra plains.

In addition to three large Air Force bases, there are 10 Aircraft Control and Warning Stations, (known as the DEW Line to most of us), south of the Alaskan Range, and 12 of these sites north of the range, where the real weather begins. The command operates three of the largest power generating plants in the armed forces, also hospitals, theaters, housing, office buildings, operational and other installations.

The climate is, of course, the biggest problem in maintaining these installations. While in many areas the weather is no worse than in some parts of the states, its severity in the interior and in the northern parts of Alaska complicates what would be a simple job Stateside.

During the year, the temperature range may span 170 F. For instance the winter lows in the Fairbanks area have reached —66 F, while the summer highs reach 99 F. In the winter months there are three or four hours of daylight and it is not unusual to experience winds in some locations in excess of 100 mph, deep snow, and peculiar ice conditions.

For the most part, standard design equipment and buildings are used, but design problems become complicated when extremes of climate must be considered. This sometimes results in a non-standard product, costing more to construct but less to maintain. When extremes are not considered in design, failure is almost certain. Thus the maintenance organization is faced not only with prob-

Fig. 2. Water line, running 8000 ft between pump house and hill-top site, is heated to prevent freezing in winter.

Fig. 3. Soils in some areas make provision of foundation difficult. Steam line shows effects of poor compaction.

Fig. 4. Electrical equipment has to be rugged for Alaskan service. This is what happens to it in southwest Alaska.

PLANT ENGINEERING Says Thank You to USAF Alaskan Air Command

IN LATE MARCH and early April, PLANT ENGINEERING's Associate Editor Marjorie Weissman spent two weeks with the United States Air Force Alaskan Air Command, visiting Air Force Bases, Aircraft Control and Warning Stations and White Alice Installations.

Our sincere thanks are due to Brig. Gen. Kenneth H. Gibson, Commander, Alaskan Air Command and to Col. Donald F. Lehnhard, Deputy Chief of Staff, Installations, for the invitation and courtesies extended; and to Maj. Raymond E. Larson, Director of Maintenance, and Capt. Joseph D. Maher, Jr.,* Chief of Preventive Maintenance Division, for their interest and time taken to make the tour. We are also grateful to Capt. Ewart C. Hooper, Civil Engineering Div.; James Thebert, Mechanical Engineering Div.; Willis E. Sharrar, Electrical Engineering Div.; and Paul J. Cunningham, Fire Protection and Aircraft Rescue Div.; all of Headquarters, Alaskan Air Command, for providing some of the information printed here.

*Since this visit was made, Maj. Larson has completed his tour of duty in the Alaskan Air Command and is now assigned to Headquarters, Mobile Air Materiel Area at Brookley Air Force Base, Alabama.

His duties as head of the Maintenance Directorate, Alaskan Air Command, have been assumed by Capt. Hooper.

Capt. Maher is now a special projects officer with the Air Force Installations Representative — North Atlantic Region, with his headquarters in New York.

lems of maintenance but also of modification.

As much work as possible is done in the summer months, but preventive maintenance cannot always wait for the season, and emergencies do arise. Imagine emergency repairs being done outdoors on an electrical distribution system in —60 F temperatures and high winds. Workmen must wear parkas, insulated pants and boots, layers of heavy underwear, wool shirts and mittens—all absolutely necessary for outside work during winter. Under these conditions, efficiency drops 85 to 90 per cent, but difficult as it is, the job is accomplished.

Two of the most critical requirements in this severe climate area are a dependable supply of power and heat (for without heat, the indoor temperature up north will drop to around freezing in an hour) and an adequate water supply, for one of the greatest dangers comes from fire.

Heat and power are generated by two methods in the Alaskan Air Command: coal-fired plants (at the main bases) and oil-consuming plants at all other sites.

Fuel presents problems in transportation, handling and storage, especially during the coldest weather. Unloading coal from railroad cars or removing it from stock piles assumes the proportions of re-mining and occasionally must be done with pneumatic tools. Shakers on coal cars are used at all bases but just don't work under severe low temperature conditions. However, closer attention to coal size and stock pile configuration has helped lessen these difficulties.

At remote stations, there are 47 prime power plants equipped with 275 diesel generators. Rated capacities of plants range from 45 kw to 1500 kw. Individual generator ratings range from 15 kw to 300 kw. Larger ratings are not used because the equipment, in most cases, must be delivered to the site by air and replacements must lend themselves to this means of transportation.

Five installations currently being completed utilize the vapor-phase system for heat recovery from the diesel engine cooling system for heating buildings.

Solutions to the Universal

But even diesels can cause unusual problems. At one facility where stand-by diesel-electric generators were installed, it was standard procedure to operate engines for a short period several times a week. Air from inside the building used for cooling and combustion was exhausted to the outside. The resulting negative pressure in the building induced low temperature air into the sanitary vents in the latrines and the water traps in the toilets causing them to freeze. Such are the vicissitudes of life in the Arctic!

At Elmendorf Air Force Base, in the center of the relatively mild "banana belt," freezing of the water distribution system during the winter months was a common occurrence. Water is obtained from an impounded stream in a super-cooled state. This obviously leaves no allowance for further cooling. Solution: the water main was routed through a surface condenser beneath a steam turbogenerator in a neighboring power plant. Heat, formerly rejected to a cooling pond, is used to raise the temperature of the water enough to eliminate freezing in the main.

Most buildings on an Air Force base need large amounts of air for ventilation in order to meet operational requirements and, at times, in Alaska, this also means a lot of heat. Standard, non-freeze, steam-heated, air heating coils, used under difficult conditions, would occasionally freeze and it was necessary to modify the arrangement in which the coils are used.

This was done by heating the recirculated air to a considerably higher temperature than usual before blending it with the cold fresh air between the heating coil and the fan. This cold air never comes in contact with the heating coil. The problem was also solved by using an indirect heating system in conjunction with an anti-freeze loop, which circulated the anti-freeze through the air heating coil.

Additional problems arise which

require seemingly odd solutions. Fresh and frozen foods are supplied by air to remote stations in light-weight, insulated plastic containers which can be reused indefinitely. The food is stored in walk-in freezers or cool rooms.

There are times at some of the northern sites, when outside temperatures are much lower than the temperatures which should be maintained in the freezers and in produce cooler rooms. It is then, while the refrigerating machinery is idle that major repairs may be carried out on the equipment.

However, these conditions require that electric heaters be placed in the rooms to prevent temperatures from dropping so low as to freeze the fresh produce.

Maintenance Aid: Utilidors

Underground utilidors, brainchild of maintenance personnel and designers, helped solve the problem of maintaining utility lines in bitter weather. Constructed of wood, corrugated metal, or concrete, they are all large enough for a man to work in and in some cases, provide passageways between buildings — highly practical in sub-zero temperatures. They all carry water, sanitary sewer and steam lines (steam lines prevent the others from freezing in cold weather) and in some cases, telephone, electrical and storm sewer lines.

Working inside the utilidors was an improvement over being outside in the weather, but what happened to the maintenance man when he came above ground after working on a steam leak, probably in a humid 110 F, into —50 F?

Well, his steam-saturated clothing would literally freeze stiff before he could reach a heated building. Now he works from a specially equipped, heated maintenance truck and, through with the job, he gets out of the utilidor directly into the truck. No more "straight-jacketed" maintenance men.

On isolated mountain-top sites, utility lines for fuel oil, water, sewage, fire hydrants, etc., are, because of rocky terrain, steep grades and inherently high construction costs, usually laid directly on the ground or supported on raceways. At most of the remote sites during the greater part of the year these life lines must be heated.

At Murphy Dome Air Force Station, just about in the center of the Territory, mineral insulated, copper-sheathed, heating cable installed inside an insulated 8000-ft-long water line between pump house and the hill-top site, prevents freezing in winter temperatures ranging from —30F to —50 F. See Fig. 2.

A typical problem with utility lines is seen in Fig. 3. A 20-in. steam main shows the effects of piping settlement due to poor compaction of earth. Because of the nature of the soils in some areas, particularly in areas of tundra and permafrost, considerable difficulty is experienced in providing good foundations.

Construction suitable for the extremes of climate encountered helps reduce building maintenance. This is especially true of roofing. From experience, it was found that roofs constructed with a minimum slope of three inches to the foot have given good service, regardless of the type of surface — copper, aluminum, galvanized iron, asphalt roll roofing, etc. Flat roofs, on the other hand, have given many problems. It is interesting to note that the Eskimos and Indians invariably use steep slopes for their roofs.

In the replacement or repair of existing flat roofs, three types of construction are used. In order of preference they are: 1. a wood frame, metal-clad, pitched roof over the existing roofs; 2. replacement of built-up roofs directly on roof deck with insulation beneath the deck and 3. replacement of built-up roofs and insulation using new cellular glass insulation on top of the deck. This insulation layer is then covered by conventional built-up roofing.

Causes of Roof Failure

Very high maintenance costs were experienced with wood, steel and concrete decks with the vapor barrier applied on the top of the roof deck. This type of construction consisted of an application of asphalt, two inches of rigid insulation, four or five layers of roofing felt mopped on solidly and covered with gravel.

Failures, as early as one year after construction, were due to one or a combination of reasons. These included: poor weather conditions during construction; application of roofing membranes on wet or damp insulation; improperly designed or installed flashing, drains and vents; application of bitumens at temperatures too low to provide penetration and bonding of felts; and foot traffic on the roofs. **End Part I**

Fig. 5. Typical of Alaskan terrain is the boggy tundra. When this protective cover is disturbed, as by laying pipeline, watery wounds will develop.

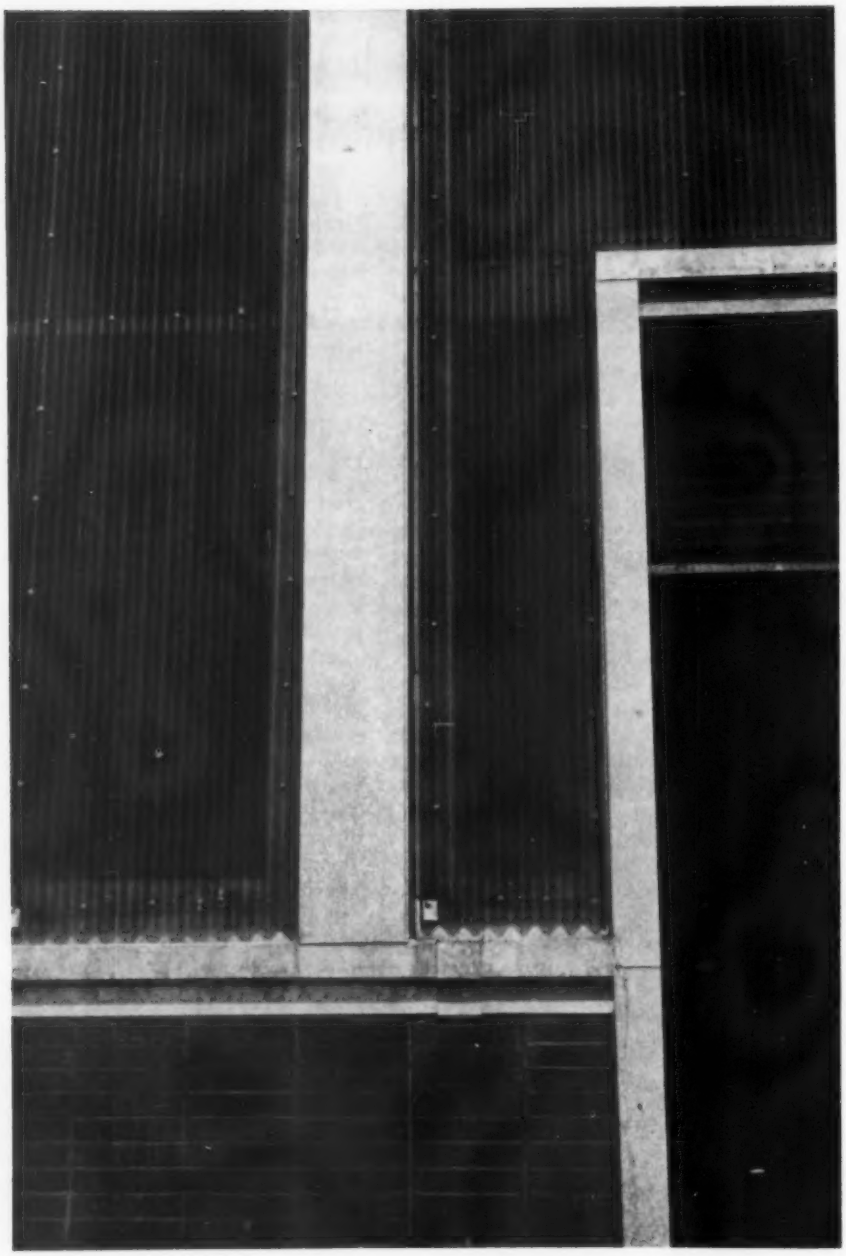


Fig. 1. Three major building wall components—corrugated plastic, galvanized steel and masonry—intersect at door opening. Not shown is insulated panel with fluted galvanized steel facing used in curtain wall.

WALL OF PLASTIC

Corrugated Panels Add New Touch To Turbine Room

By J. R. KESTER, Assistant Mechanical Superintendent
Zinc Smelting Division, St. Joseph Lead Company

INCORPORATING some of the newer construction materials in industrial building with older, proven materials, the St. Joseph Lead Company designed a new 100,000-kw power plant to supply power to its electrothermic zinc smelter. The plant is under construction on the south bank of the Ohio River, adjacent to the company's zinc smelting division, approximately twenty-five miles north of Pittsburgh, Pa.

The main building, which is ap-

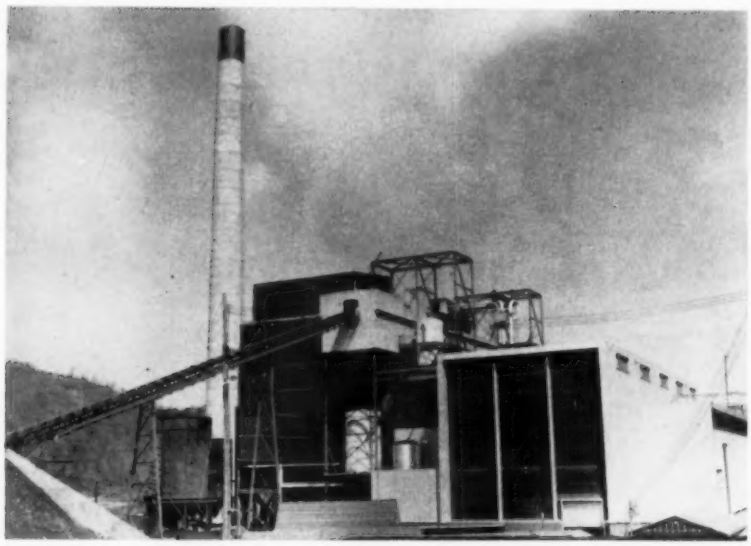


Fig. 2. Building at right has plastic "face", for maximum daylighting, decoration.

proximately 200 ft long, 120 ft wide and 65 ft high, has a basic framework of conventional reinforced concrete and structural steel. The shell of the building, however, features the innovations in wall construction.

Plastic Siding Installation

To serve the dual purpose of decoration and light transmission, approximately 4200 sq ft of Filon corrugated plastic siding were used, the bulk of which was installed on the west wall of the building. This material is the fire-snuff type with 2.67-in. by ⅞-in. corrugations, translucent aquamarine in color, and is fastened to the building framework with stainless steel self-tapping screws. The joints are sealed with clear adhesive and ¾-in. rope seals are used at the jambs. Closure materials are rubber corrugated strips.

Rigid plastic sheeting is a permanent part of the wall installation. It was installed at a cost of $1.32 per sq ft, compared to an installed cost of $1.73 per sq ft for the galvanized sandwich walls; however, the thermal and sound insulating qualities of the galvanized walls are superior to those of the plastic sheets.

The major portion of the building wall area (approximately 35,000 sq ft) is covered with sandwich panel construction of galvanized sheet and rigid Fiberglas insulation. All panels are of 20-gage sheet steel, galvanized with a 2-oz per sq ft zinc coating for corrosion protection. The outside walls are made up of panels having vertical rectangular flutes 2½-in. wide and 1½-in. deep on 6½-in. centers. The overlap ends of the sheets are countersunk on the bottom sheet with the top sheet extending at least 2 in. over the bottom. The insulating material is 1½-in. thick, 3-lb density Owens-Corning rigid Fiberglas batts. The inside panels are 20-gage flat sheets, also galvanized with a 2-oz per sq ft zinc coating.

More than 100,000 sq ft of zinc-coated sheet steel was supplied by Jones & Laughlin Steel Corp. to H. H. Robertson Co. for fabrication and erection. Since field tests and actual experience have proven that the life of a galvanized sheet is proportional to the thickness of zinc coating, only sheet with a 2-oz coating was used in the construction of the building.

Built-up Roof Construction

The roof is an "M" deck built-up type with an adhesive layer on the metal, a Koroseal vapor barrier, another layer of adhesive, 2 in. of Fiberglas roof insulation, four plies of tar-mopped felt, a 75-lb coal tar flow coat, and finally a gravel surfacing of 400 lb per square.

The main building houses two 3600 rpm, tandem compound, double flow, reheat steam turbines directly connected to hydrogen cooled generators with a nameplate rating of 53,000 kw each at 14,400 volts.

The building, when completed, will provide attractive, long life, maintenance-free housing for the expensive equipment contained within. It is anticipated that no painting will be needed on the external surfaces for at least twenty years. **End**

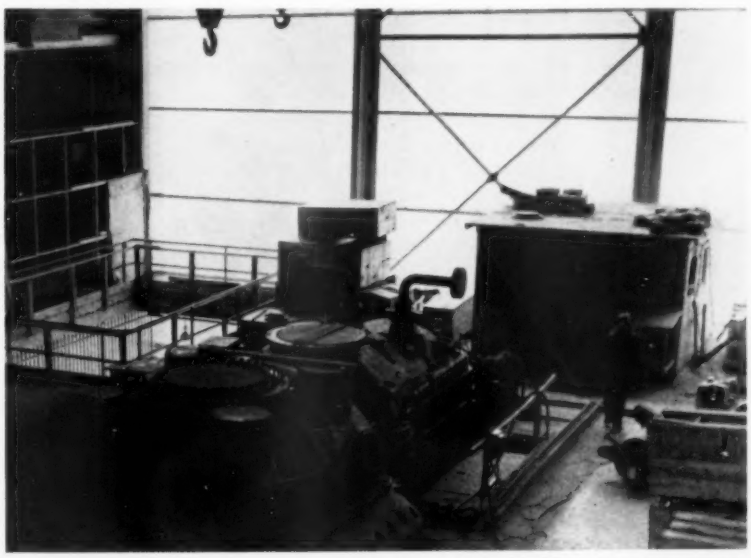


Fig. 3. Interior of generator room illustrates high level of light transmittal.

COST CONTROL IN MAINTENANCE

Control of Basic Organization

Control of Work Requests

Control of Labor Expenditures

Control of Costs Other Than Labor

By W. C. COOLEY, Asst. Mgr., Plant Engineering, Lockheed Missile Systems Div.

ANY MAINTENANCE department manager who wishes to hold his costs to a minimum could really use five arms and at least one extra pair of eyes. The big job of any maintenance department manager is giving the best service possible while, at the same time, keeping within the allocated operating budget. The tighter the budget the more difficult it is to give good service and the more necessary it is to keep a tight rein on all costs.

The reins which enable you to control maintenance costs lead to four areas where this control must be exercised. The four areas are as follows:

1. **Control of your basic organization.**
2. **Control of all work requested and accomplished.**
3. **Control of labor expenditures.**
4. **Control of all expenditures other than labor.**

There are two other aids to keeping maintenance costs down. One is flexibility and the other is foresight. You, as department manager have undoubtedly realized the value of the above controls and the necessity of considerable foresight, but do you know how to go about controlling costs and how flexibility and foresight enter into the picture?

1. How To Control Your Organization

The importance of a smooth running and efficient organization in controlling costs cannot be overemphasized. Your organization should be designed so that each member of supervision has only those functions reporting to him that he is capable of handling easily, and in such a way that no supervisor has an abnormally large number of people reporting directly to him.

A balanced organization with each supervisor fully aware of his functions and responsibilities means an efficient organization where costs are kept to a minimum. Once the organization is properly established, the assurance that your men are working at peak efficiency can only be reached with tight organizational *control.*

This control must stem from the section supervisor down through the supervisors and leadmen to the men. Each leadman must know the exact status of each job he has and the status of the work being done by each man working for him.

Likewise, his supervisor must be aware of all work done by his group and must be trained to delegate as many details of each job as possible to his leadman. The section supervisors must be aware of the work in general within their area of responsibility, and must have their supervisors trained to report the details on any job at a moment's notice.

2. How To Control Work Requests

In order not to overload your maintenance shop with a lot of unnecessary work, tight controls are needed on what work will be done. These controls may be exercised in several ways. One excellent method is to require the signature of the department head on every job request and the signature of the next higher authority for jobs costing over a fixed amount, say $100.00.

Unimportant requests often are forgotten when it is known that the requester must obtain the department head's signature for this work. A second effective method for holding down the number of requests is to notify each department in advance of the cost of the work requested. Often when the

cost is known, the job is cancelled. Neither of these methods prevents important work from being done. There is always justification for important work. It is only the unimportant work that is eliminated.

In addition to the above two controls, it is the responsibility of each supervisor to screen all work requests to see that proper justification for the work exists. No work, other than routine repair and maintenance work, should go to the shop without first being screened by supervision.

3. How To Control Labor Expenditure

Controlling the time of each man within the maintenance shop can only be exercised if no man works on any job without an authorizing document of some type. Each job should be written up on this document, clearly stating the nature and type of work to be done. The man receiving this order should enter on the work order, the time of starting and stopping.

In this way, an accurate analysis can be made of the time spent on the job. It is then up to the leadman to check each of the work orders to see that the time charged is not excessive, or if so, what explanation there is.

A second method for controlling time on a job is to set up time standards for all repetitive jobs. As most maintenance work is far from repetitive in nature, time standards are most effective in certain areas and in certain crafts. Plant clean-up work, or janitorial work, lends itself very well to time standards. Certain types of painting jobs can be developed into standards, such as painting of flat walls or spray painting of large areas.

In addition, preventive maintenance jobs can often be covered by time standards. These standards, when developed, should be used as guides only, because, very often, work quality falls rapidly when men push to complete a job within the standard time allotted. All men should be informed that these standards are to be used as guides only.

4. Control of Other Expenditures

No maintenance department can hold the reins on costs without a tight control of all material and equipment expenditures. This control is obtained through first, training your supervision on proper cost control methods and the theory behind cost control, and second by screening and sampling of all expenditure requests. For the purpose of this article, all expenditures have been lumped, whether for maintenance materials and supplies or for capital equipment, under the heading of "Expenditures."

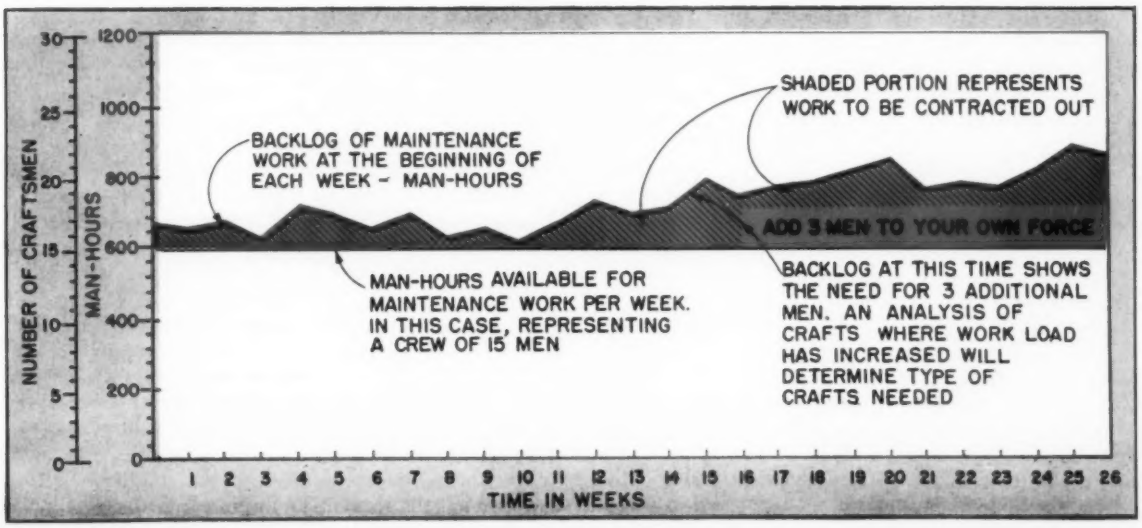
All maintenance supervision should be schooled in the application of the "necessity" factor in expenditures. They should be familiar with, and trained to use, the old "what, where, when, why, and whom" adage for all expenditures. They should be trained to spend the company's money with the same caution they exercise in spending their own money.

When they ignore and/or overlook applicable factors in screening requests for expenditures, or when they do not place the relative importance of the expenditure in the proper perspective, they should be promptly corrected. Training in this "necessity" factor takes a long time. You, as department head, must work continually with the maintenance supervisors, explaining, with examples, the "necessity" factor and how to properly determine the justification for the expenditure in terms of cost saving.

Most important of all, they should be trained to look at the proposed expenditure with an unbiased eye. As background material to help your supervision properly evaluate all expenditure requests they should be familiar with the over-all policies of your company with regard to expenditure of funds for capital equipment, materials and supplies. A general understanding of these policies, what capital equipment is, and how budgets are formulated for operating expenses, will assist them in determining the validity of the justification for any expenditure.

Equally important, you, as department head, must

A chart like this not only helps you determine what portion of maintenance work could or should be contracted out; it also justifies addition—or subtraction—of men to or from your own force when work load makes such action advisable.


NUMBER OF CRAFTSMEN
MAN-HOURS
30
25
20
15
10
5
0
1200
1000
800
600
400
200
0
SHADED PORTION REPRESENTS WORK TO BE CONTRACTED OUT
BACKLOG OF MAINTENANCE WORK AT THE BEGINNING OF EACH WEEK - MAN-HOURS
ADD 3 MEN TO YOUR OWN FORCE
MAN-HOURS AVAILABLE FOR MAINTENANCE WORK PER WEEK. IN THIS CASE, REPRESENTING A CREW OF 15 MEN
BACKLOG AT THIS TIME SHOWS THE NEED FOR 3 ADDITIONAL MEN. AN ANALYSIS OF CRAFTS WHERE WORK LOAD HAS INCREASED WILL DETERMINE TYPE OF CRAFTS NEEDED
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26
TIME IN WEEKS

personally be aware of all expenditures even though you have trained your supervision in this detail. In theory, you should personally check into each expenditure request carefully, to insure adequate justification. This is very difficult, as few department heads have the time, or can take the time, to do this thorough a job.

There are two alternatives left for you. First, you can skim over quickly each request for expenditure of funds, and thereby get some idea of the justification. Or second, you can check thoroughly certain expenditure requests at random. This second method, a tried and true quality control method, works most effectively. Random sampling means checking thoroughly a percentage of all expenditure requests, selecting those to be checked at random in no particular pattern.

Random sampling is good. Your supervisors never know which requests you are going to check thoroughly, therefore they are going to be sure all requests can be justified. Second, this method takes little time.

Flexibility—and How To Get It

Webster defines flexibility as that which is "responsive to or readily adjusted to changing conditions" or "capable of being adapted, modified, or molded; plastic; pliant." Flexibility in the maintenance department means the capability of doing a great variety of jobs on various shifts at minimum cost. One of the best ways to obtain flexibility is to have representative maintenance crafts on two shifts.

In this way, work that cannot be done on the day shift may be done on the night shift without the necessity of overtime. Secondly, jobs which, if done on the day shift, would cause disturbances in other areas, can be done when no personnel are around to be disturbed. Some jobs, such as inside building painting, are almost mandatory night shift jobs. The ability to divert work from one shift to another gives a great measure of flexibility.

A second method by which flexibility may be built into your maintenance department is, while maintaining a constant backlog of maintenance work designed to keep a steady crew of maintenance men busy, to contract out all peak work loads and unusually large jobs. The accompanying chart shows one method of determining the amount of maintenance work that should be contracted out. By contracting the peaks, your backlog stays constant and the extra work thrown in unexpectedly gets done within a reasonable time.

Flexibility in maintenance also means utilizing all maintenance crafts for all types of work. Naturally a maintenance man does best at the craft in which he is trained. However, occasionally jobs develop where there are insufficient personnel within the affected craft to perform the job. With flexibility in your shop, men from all crafts assist in doing this job and getting it done.

This flexibility keeps all maintenance crafts busy, saves considerable money, and allows you to keep a minimum work force, all working. One word of caution. Highly paid craftsmen should never be used at unskilled jobs when unskilled personnel are available. Using skilled personnel in unskilled work should be kept at a minimum and used only in emergencies or to avert temporary hiring or layoffs.

Occasionally in maintenance, as in any other department, the work load slackens. You, as department manager, usually know that this lack of work is a temporary condition and that in a relatively short time you will be back working as busy as ever. In order to take up the slack in these lean times, every crafts supervisor should maintain a list of "rainy day" jobs that can be postponed.

These jobs allow you to perform a great deal of needed repair and maintenance on buildings, equipment and grounds which, heretofore, never could be done because of pressure of other work.

The maintenance department manager must be continually looking into the future. He should check the road ahead, using any and all devices available to him, to see as far into the future as he can and having seen, then plan as far into the future as possible. The four aids to controlling costs plus the necessary flexibility can only be developed if you, as department manager look into and plan for the future. Foresight means extensive budget planning and continuing estimates of future requirements.

Foresight—and How To Develop It

Some of this foresight is forced automatically by required reports within your company, such as personnel and budget forecast reports, capital expenditure forecast reports and others. In addition to these, moreover, forethought means sitting down frequently and thinking "Where are we going from here?" "What will be our situation 6 months from now?" "What will we require in the line of men, material, equipment, space, etc., next year?" "Will my present systems work in an expanding organization?" "Will the forecast reduction in force mean that my present systems and procedures will become too cumbersome?" "How will I expand?" "How will I reduce?"

No department head should make a decision involving hiring, firing, promoting, laying off, purchasing, selling, expanding, contracting, or anything connected with the above without first sitting down and thinking it over carefully. The stigma of a reversed decision can often be eliminated with adequate forethought.

All of the first five items mentioned, the four controls and the necessary flexibility, can assist you in holding the reins on maintenance costs. However, none of these five can be effectively instigated or maintained without considerable foresight and planning by you as department manager. Be sure you know where you are going, and the condition of the road ahead, then make your plans. **End**

Fig. 1. Overhead view shows how packages move down conveyor line. Electronic controls know when to divert package to proper conveyor.

CONVEYOR SORTS VARI-SIZED PACKAGES

PACKAGES OF all sizes and shapes are separated for 15 different distribution points on a high speed assorter-conveyor now in operation at Railway Express terminal facilities in Long Island City, New York.

The conveyor system — which can practically see and think for itself—is 180 ft long, 3 ft wide and has been integrated into the terminal's main powered conveyor line to speed handling and distribution of inbound and outbound express shipments.

Equipped with electromechanical controls the semiautomatic assorter-conveyor can be operated at speeds from 100 to 300 fpm and can handle 3000 individual packages an hour.

Designed and custom built to the agency's specifications the new materials handling unit was developed by Nelson Laboratories and Railway Express engineers.

Here is how the system works. Packages going to various destinations are placed on a powered belt conveyor and move into a marking area where employees mark each piece for a specific separation point according to its destination. Marked shipments then enter the assorter-conveyor area and move past a viewing booth which houses an operator and an electronic control box equipped with a lettered keyboard. This is the control station for the new assorting device.

As packages move by the booth, the operator depresses an appropriate key on the control box which corresponds to the mark on the package. Photo-electric eyes which flank the assorter-conveyor just beyond the booth measure length of the package and relay a signal to a memory wheel in a synchrotimer device.

At a synchronized time, the memory wheel activates the exact number of triangular-shaped steel fingers that will be needed to guide the package down the assigned distribution line.

Shipments are propelled down auxiliary powered and gravity rollers to platform edge and loaded into trailers for transport to other terminals.

To help insure a smooth continuous flow of traffic the assorter-conveyor is equipped with automatic signals which sound an alarm when any auxiliary conveyor finger is about to be filled. A recirculating arrangement automatically diverts packages, refeeding them into the assorter-conveyor area when auxiliary conveyor fingers are filled. **End**

Fig. 2. As marked packages move pass booth, operator depresses proper key.

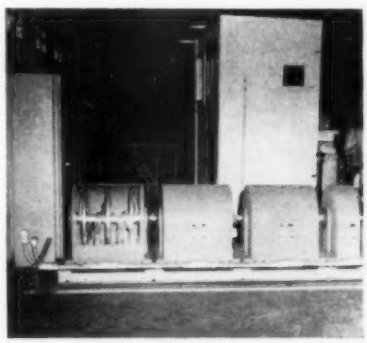


Fig. 3. Control unit, left, synchrotimers, foreground, are brains of system.

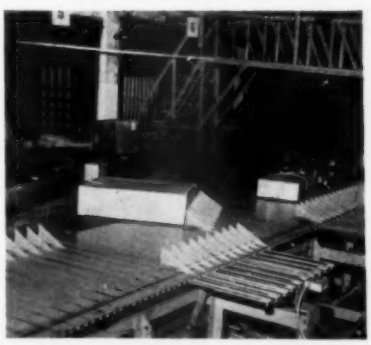
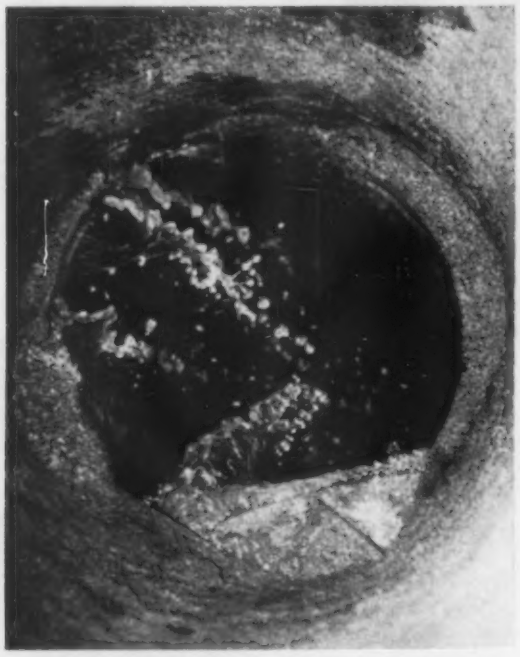


Fig. 4. Close-up shows how steel fingers push package to branch conveyor.

Water Coming Through Casing. . . .



Remedy for this job was a tight-fitting steel casing.

Wrinkled and Torn Casing. . . .

Photo log revealed damage that was repaired quickly.

PHOTOGRAPHIC DIAGNOSIS, or . . . . .

ENGINEERS HAVE long been harassed by diminishing water supply from deep wells. Faced with the deterioration of wells penetrating thousands of feet into the ground, engineering management is naturally concerned about the cost of driving more wells. In addition, the perplexing problem of "guesstimating" the specific ailment that has curtailed an expensive water supply, has many a good engineering department baffled.

One of the greatest aids to deep well owners since the rotary rig, is a combination of techniques that involves sending a specially built camera almost 10,000 ft underground and underwater, to take actual photos in stereoscopic three dimensional pairs, to evolve a photo log which pinpoints the trouble and eliminates time and money wasting guesswork.

This technique is invaluable in the investigation of inaccessible or hazardous underground and underwater structures. Mine shafts, gates, release ports and drain channels of dams, penstocks for hydroelectric plants, gas, fuel and oil lines, and drainage and sewer pipe lines can be photographed without interrupting their operation.

Such a photo log provides an accurate and indisputable visible record of conditions and serves as a most reliable guide for evaluation of necessary procedures. Thus it plays the same role in engineering as does the X-ray in medicine.

Many industrial establishments rely on deep wells for their prime water supply. In the field of agricultural engineering, many large operators have as many as 50 to 100 deep water wells. These run in cost from $5000 to $50,000 each, and in each of these wells is a deep well pump, with its cost ranging from $5000 to $30,000.

With the process developed by a California engineering concern, Laval Underground Surveys, 2216 East McKinley Ave., Fresno, the camera, encased in a steel bullet-like cylinder, is lowered into the hole and its strobe light shot to take pictures of the inner casing. Developed on the spot, the pictures may show the water supply isn't at fault at all, and the reduced gallonage only the result of a wrinkled or collapsed inner casing.

Sand in industrial plant operation is particularly onerous. Many times old wells will suddenly commence pumping sand. Through visual inspection, the point of entry of the sand may be determined. Design specifications of the well, and flow rates for water strata may be calculated, and remedial meas-

Tubercle Encrusted Well. . . .

Modern sterilizing techniques restored life to well.

Compression Break in Well. . . .

Reduced water supply so it endangered plant operation.

What's Wrong Inside the Well Casing?

ures adopted to reduce or eliminate the sand discharge. Thus sand is prevented from clogging pump lines and being otherwise destructive to pumping systems.

Again, when industrial plants take their water supply from wells, the area of the well field is extremely limited. In many cases, water wells are drilled in the corners of yards, or even within buildings. Obviously, the well's value may be far greater than its original cost, because replacing a well under such conditions involves tearing out facilities to make room for another well.

When it is considered that in most areas a properly maintained well should last from 30 to 40 years, and that there are many cases of well failure in industrial plants within the first three or four years of life, the new investigational technique, employed as part of the plant's preventive maintenance program, in periodical inspection, affords a certain and inexpensive method of prolonging well life.

Hydraulic testing of the wells with this photographic process anticipates trouble and indicates the remedy. What's more, the cost of such a preventive maintenance program is more than offset by the reduced cost of pumping.

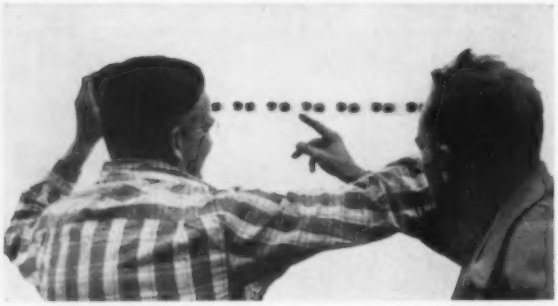
For example, when water is withdrawn from a well, the level of the fluid within the well must be reduced to permit inflow, or "draw down". If the water draws down 100 ft, then the cost of lifting the water out of the well is the cost of lifting it to overcome the draw down. Obviously, if this 100 ft draw down can be reduced to 50 ft of draw down, a sizable saving in power demand results.

Since it is commonly known that many wells develop an increase in draw down over a period of years, the plant engineer is vitally concerned in the matter of keeping the draw down at a constant level.

Periodical investigation via photography thus becomes an invaluable ally of the engineer.

One of the most common failures of industry's wells in deep alluvia is axial stress. When the stress exceeds the elastic limit of the casing, strain shows in the form of peripheral wrinkles. These first appear as slight ripples in the casing, sometimes continuous around the wall—sometimes non-continuous. Generally the zone of strain does not extend more than two feet along the vertical axis. But, as it continues, the wrinkles increase in depth and they develop to the point of rupture. Continued dis-

"Thanks to photography, guesswork in well maintenance is eliminated."



Stereo photos give the 3-D pictures required to pinpoint remedial measures, tell exact tools needed to effect repairs.

tortion results in folding of the casing either into or away from the wall.

Experience has shown that occasionally the folding or crumpling of the casing may seal the break so that the sand is shut off and the discharge flow again clears up. And that's where a photo log is of prime importance.

If allowed to continue in operation, such a well with a bad compression break will remove so much of the formation around the rupture that subsiding clay or shale will shut off the water flow completely and ruin the whole well structure.

A compression break usually occurs very slowly. Sometimes several years elapse during its development, whereas collapse from hydrostatic pressure is sudden and violent and frequently evidences itself by a sharp report at the surface when the failure occurs. If a collapse occurs at a zone where a suction pipe is suspended, it will sometimes distort the suction pipe. Also, there are records of collapses taking place above turbine pump bowl units, and some that have flattened the column pipe.

Relatively little trouble has been experienced with the shallow wells. Many of these have lasted as long as 40 years, and their average life expectancy could probably be set at 30 years. But the record of deep wells, plant engineers report, has not been so good. Some of them have developed casing breaks during the first month of use. In some areas, life expectancy has been as low as five years.

Until recent years, only about half of the broken casings could be satisfactorily repaired. When engineers attempted to track down reasons for premature failure, causes were suggested including electrolysis and corrosion, hydrostatic pressure, earth movements, formation collapse, faulty joints, defective casing. Each was investigated carefully, but no single cause could engineers identify. The investigations all indicated that some means of visual inspection was needed to determine the cause and perfect remedial techniques.

Among the latter is the making of an annual photo study which immediately reveals any significant changes that threaten the plant's water supply. Whether or not such yearly inspection shows any change in conditions, at three year intervals the all-important well is photographed from top to bottom. This is done to relieve the plant engineer's anxiety concerning possible strains in the casing; calcination, rust, tuberculation, algae and the presence of bacteria. The engineer is furnished with records of findings and work done on the well.

From these records, trends can be established and plans made to control the trends. When combined with original design data and drilling records, a basis for good well management is established. Such records are proving invaluable in formulating criteria for the design of new or replacement wells.

Thanks to photography, the guesswork has been removed from well design, maintenance and repairing.

How much of a boon this may mean to plant engineers is evidenced in the action of a group of the largest casualty companies who are now offering all-risk well insurance for a premium of 10 per cent of replacement cost for three years.

Where a plant is to be constructed in an area, or on a property where an existing well-water supply is the prime essential for the plant's profitable operation, it may be impossible to evaluate either the size of the well or its condition.

A photo log provides proof positive, for example, if a so-called 18-in. well is really 12 in., or whether its diameter has been dropped to 10 in. somewhere below ground level. With such information, the plant engineer is in a much more intelligent position with respect to judging his future water supply.

In the investigation of sewer lines and pipelines, a picture made from a survey avoids needless expense involved in digging up sections innocent of wrong-doing.

Thus photography has become another of the useful tools which the plant engineer can employ in his constant efforts to reduce costs and increase efficiency. **End.**

Steel-enclosed camera is but a part of the rig that is handled entirely by one man. He photographs, develops, prints and interprets pictures on the job. Truck carries all equipment.

CONSTRUCTION SPECIFICATIONS

II. Taxes, Payments, Arbitration and Guarantees

By R. E. WALLIN, Chief Engineer, Construction, Plant Engineering Dept., Joseph T. Ryerson & Son, Inc.

PROPER PROTECTION of your company against legal entanglements is one of the principal advantages of a good set of specifications. They should clearly state who will be responsible for the payment of permits, inspection fees, insurance and taxes. We continue in part II, the discussion of general conditions that should be made a part of any construction specification.*

TAXES. Tax structures vary with the different states, and it is always best to spell out who is to pay various taxes, duties, and tariffs imposed by federal, state, or local laws, as well as assessments or charges for social security, retirement, and unemployment benefits. The statement should also be made that such taxes and assessments are a part of the cost of the work unless otherwise stipulated and that such costs become a part of the contract price.

PATENTS. There is always danger of patent, trademark, and copywright infringements, and hereunder the contractor should be alerted that he shall save, defend, hold free and harmless and indemnify the owner for any damages resulting from such infringements.

PAYMENTS. In order to avoid needless disputes, it is advisable to have a definite understanding of payment policies with reference to contractor's activities.

PAYMENTS WITHHELD. There is a possibility that the owner may wish to withhold payment to protect himself from loss on account of defective work, possible claims, and failure to properly make payments to subcontractors, doubt that a job can be completed for the balance unpaid, damage to other contractors, and so on.

UNCORRECTED WORK. In some cases, work is not executed in accordance with specifications and plans or is damaged during construction and it is deemed inexpedient to correct such work; therefore, an arrangement should be made hereunder for equitable deduction from the contract price.

OCCUPANCY. There are times when a job is adjacent to an existing plant or a job is partially occupied before full completion. It should be pointed out that occupancy or use by the owner or any persons under contract with the owner of any portion of the work does not constitute acceptance of the work or any part thereof.

FINAL ACCEPTANCE AND PAYMENT. Cover the basis on which final inspection is made and final payment becomes due and payable.

FIRE INSURANCE. Outline very clearly the obligations of the owner, as well as the contractors, with reference to maintaining builders' risk, fire and extended coverage insurance upon expendable parts, as well as nonexpendable items used in connection with the job.

CORRECTION AFTER PAYMENT. It is impossible to test a summer cooling system if a job is finished at the beginning of a heating season; therefore, under this heading should be stated that neither the final payment nor any provision in the contract documents will relieve the contractor from responsibility for faulty materials or workmanship. He shall remedy any defects due thereto and pay for any damage to any work resulting therefrom which shall appear within a given period of time from the date of final payment.

CHANGES IN THE WORK. It is always a good policy to have a definite procedure to cover changes made in drawings and specifications which result in elimination of work, changes in work, or additions of work. Minor changes, as a rule, not involving extra

ISSUER'S NAME

CONTRACT CHANGE ORDER NO C-11

TO: Contractor's Name
Street address
City (zone) State

Refer to this Change Order Number in all correspondence.

ACCOUNT NO. X-1236

RE: Extra Floor Paving

EFFECTIVE DATE Nov. 1, 1957

You are hereby authorized to make the changes described below in connection with your contract dated March 1, 1957, for general work.

The changes described herein are to be performed subject to the same conditions in the above mentioned original contract as fully as if such conditions were repeated in this Change Order.

DESCRIPTION OF CHANGES:

Furnish necessary labor, material, equipment, supplies, and services required, and complete additional floor paving in area bounded by columns A9, A14, B14 and B9 with 8-inch concrete in accordance with covering specifications.

MONETARY CONSIDERATION:

The above work to be completed for the lump sum price of SIX THOUSAND THREE HUNDRED FIFTY DOLLARS ($6,350.00), in accordance with Mr. Smith's quotation dated October 30, 1957.

This amount hereby becomes an addition to the contract price.

Accepted (Contractor's Name) (Issuer's Name)

By _____ By _____

Date November 4, 1957 Date November 1, 1957

Fig. 2. Change order form is used to authorize changes in work and contract price after final contract is signed

*Part I of this series on Construction Specifications appeared in the August issue of Plant Engineering.

"The true foundations underlying the physical construction are the plans and specifications . . ."

cost and not inconsistent with intent of the drawings and specifications, can be made at no change in contract price.

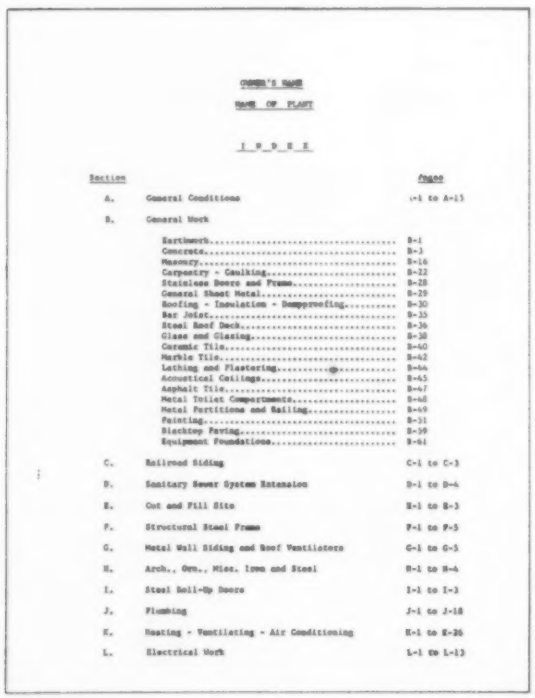
On the other hand, if the changes made materially increase or decrease the cost of the work, the basis for determining the valuation of these changes should be outlined. For internal auditing purposes it is often good practice to outline a system and provide a "change order" form to cover such changes. Figure 2 illustrates a change order form which is planned for use to deduct from or add to a contract price, amounts for omissions, revisions, or additions, as outlined and bid after issuance of bulletin (see Figure 1) or after verbal or written request.

WAIVERS OF LIEN. A check should be made of the lien laws of the state in which work is being done, and an outline should be made of the manner of handling contractors' affidavits, partial waivers of lien and final waivers of lien.

FENCES AND BARRICADES. Most contractors are conscious of the need for maintaining fences and barricades around open excavations and construction sites to prevent accidents and to avoid thefts of material. Your requirements should be clearly stated.

WATCHMEN. The obligations of the respective contractors with reference to maintaining watch service to protect against theft, damage, and accident should be set forth. Sometimes one contractor is named to furnish such service for all contractors, and sometimes, if the project is an addition to an existing plant, the owner will take over this activity.

JOB OFFICES. Clearly outline what facilities the general contractor should provide, what space must be provided for the owner's representative, and how other contractors are to take care of their offices, storage buildings, shanties, trailers, etc., and what locations they may use on the site. The owner should state to what extent signs and advertising on the job site will be permitted.



OWNER'S NAME

NAME OF PLANT

I N D E X

Section		Pages
A.	General Conditions	A-1 to A-13
B.	General Work	
	Earthwork	B-1
	Concrete	B-3
	Masonry	B-16
	Carpentry - Caulking	B-22
	Stainless Doors and Frame	B-28
	General Sheet Metal	B-29
	Roofing - Insulation - Dampproofing	B-30
	Bar Joist	B-33
	Steel Roof Deck	B-36
	Glass and Glazing	B-38
	Ceramic Tile	B-40
	Marble Tile	B-42
	Lathing and Plastering	B-44
	Acoustical Ceilings	B-45
	Asphalt Tile	B-47
	Metal Toilet Compartments	B-48
	Metal Partitions and Railing	B-49
	Painting	B-51
	Blacktop Paving	B-59
	Equipment Foundations	B-61
C.	Railroad Siding	C-1 to C-3
D.	Sanitary Sewer System Extension	D-1 to D-4
E.	Cut and Fill Site	E-1 to E-3
F.	Structural Steel Frame	F-1 to F-5
G.	Metal Wall Siding and Roof Ventilators	G-1 to G-5
H.	Arch., Ornm., Misc. Iron and Steel	H-1 to H-4
I.	Steel Roll-Up Doors	I-1 to I-3
J.	Plumbing	J-1 to J-18
K.	Heating - Ventilating - Air Conditioning	K-1 to K-26
L.	Electrical Work	L-1 to L-13

Fig. 3. Index breaks trades down to letter sections. Numbered paragraphs in sections permit rapid reference

Get These for Your Files— There's No Charge— But Request Must Be Made On Your Company Letterhead

A 16-page copy of section A, "General Conditions," applicable to all contracts, large or small, is available without cost to you. This section, the result of years of experience, gives the exact wording of each paragraph to help convey the intent of your planned work and to properly protect your company from unnecessary litigation.

Also, full size reproductions of the bulletins shown in Figs. 1, 2, 3 and 4, covering changes in specifications or plans, contract change order forms, useful index, and a page from a typical trade specification will be sent to you upon request. **Request must be made on your company letterhead; all other requests will not be honored.**

BOND. The owner's policies or circumstances may require the posting of a bond by a contractor, and, here, it should be stated on what basis such a bond will be provided and paid for.

TESTS. In construction there are various materials requiring progress or final tests, and this should be covered in some detail to avoid later costly alterations or repairs.

OTHER CONTRACTS. The owner may wish to carry on, simultaneously with the work under any one contract, work by other contractors. The owner's right to do so should be reserved under this heading.

PUBLIC UTILITIES. If a construction site is beyond the limits of public utility lines, it may be necessary for the owner to arrange with public utilities or governmental agencies for the extension of utility service to serve the project. It may be necessary to reroute or change utility lines. All of this should be set forth to avoid misunderstandings.

The author was responsible for all construction activity on this warehouse and office building located in Milwaukee

GUARANTEE. We have already covered one instance of furnishing a guarantee under the heading "Correction of Work After Final Payment." It may be that a guarantee period has been given in a section covering the work being performed by a specific trade. However, it is advisable to state under this heading that, unless otherwise provided in the contract, the contractor shall guarantee his work for a stated period of years from the date of the final payment against defective workmanship or material and that he shall also be responsible for any injury to any other portion of work resulting from his defective workmanship or materials. In other words, outline a minimum guarantee period which will apply when it is not otherwise covered.

In addition to a section covering "General Conditions" which has been discussed above there are other sections of a set of specifications which cover the physical construction of the project. Generally speaking, it is a good plan to write these sections in the sequence in which construction on the job progresses; also, to edit each section by the trades that progressively will work on the job.

A good set of specifications should have a preface sheet which outlines: that the specs cover all trades; the name of the job; the location of the job; the name of the owner and its home office address; the date of the specs; and identified names of the architect and the consulting engineers.

A good, clear index is very desirable. Figure 3 outlines a rather broad index for plant and office construction.

If no railroad siding is required, sanitary sewers need not be extended, and the job site is fairly flat and no cut and fill work is required, then these sections can be omitted and any work of minor nature in connection with such activities can be incorporated under subheadings in the general work section or under some other prime contract heading.

Under each of the main capital lettered section headings can be included subheadings to cover the various trades and activities similar to that outlined under Section B, General Work. To illustrate, under General Work are such subheadings as earthwork, concrete, masonry, carpentry, etc., and any other activity which may be part of the responsibility of the general contractor under the heading of General Work. Similar subheadings may be used for other prime sections, such as plumbing, heating, electrical, etc.

As mentioned above, if only a general work section is to be edited, then the erection of structural steel; architectural, ornamental, and miscellaneous iron work; and other capital lettered sections can also be included as a part of the General Work section. Since plumbing, electrical, heating, ventilating, and air conditioning work is generally a subcontract, even though handled by the general contractors, separate sections are normally written, but they, too, could be

made a part of the general work section if you prefer.

Architects and engineers over the years develop a routine for editing specs. The most desirable routine, of course, is one which definitely checks that the plans and specs cover all conditions. This must be accomplished in the most thorough manner possible. Having a set of prints in front of the specs writer is a must, for he can then make notes on the plans of things to be added. Also, he can check the plans to make certain he does not cover in the specs what is already covered.

Architects and engineers also develop, over years of experience, their own way of identifying sections, pages, and paragraphs of their specifications. We prefer to identify the various sections by a capital letter. We identify the pages of the section by the same letter with a suffix number. Subheadings are then shown in small letters, and marginal headings are used for various work activities. The paragraphs in the sections are numbered from "1" on up to whatever number applies at the end of the section.

By this method, in correspondence or other references one can always say "Section F, Structural Steel Erection, Page F-6, Paragraph 40"; the paragraph being referred to can readily be found. Figure 4 illustrates this method of identification.

Figure 4 also illustrates a sequence of headings which progressively outline the activities of the contractor who will bid the job and later do the work.

The headings "General" and "Scope" should be part of every section. "General" ties the respective section in with the "General Conditions" section. "Scope" should briefly and broadly outline all work to be included and excluded under the contract.

The following pages of this typical section might include these marginal headings: Stockpiling, Filling, Placing and Compacting Fill, Moisture Control, and on to the end. Under each heading should be given clear, understandable, and complete information on

Owner's Name
Name of Plant
E-1

SECTION E

CUT AND FILL

GENERAL

1. All work covered in this section is subject to the applicable provisions of Section A, General Conditions, which is attached hereto and is a part hereof, and the Contractor shall be responsible for and be governed by the requirements therein.

SCOPE

2. The work to be performed under this section includes the furnishing of all labor, contractor's equipment, materials, if any, tools, and services necessary for and incidental to stripping the site of trees, brush, and other vegetation, excavating the high areas and filling the low areas, as shown on the plans; the compacting to maximum compaction of the ground areas to be covered by the plant building, office building, truck and passenger car driveways, and parking areas, as shown on the plans; the stockpiling of top or vegetation supporting soil for backfill and landscaping; and the disposal of all surplus soil to specified areas on the Owner's site.

DRAWINGS

3. The working areas have been fully designated on the drawings and profiles. All excavations generally must conform to the lines and grades shown on these drawings and must meet the approval of the Engineer.

4. Stripping work shall consist of removing trees, brush, and other vegetation, and excavating the top soil from all areas which are to be cut or filled.

5. Enough area on the site shall be stripped of top soil to provide space on which to deposit fill material secured by excavating for foundations, floor slab, mechanical trenches, etc.

CUTTING

6. This Contractor shall be responsible for excavating all material down to required grades, as shown on sheet A-1 of plans.

7. The equipment used can be of any type as long as the resultant work conforms to the requirements set forth herein.

8. All cut material shall be retained on the site unless otherwise stipulated herein.

9. Only acceptable material shall be used for fill.

10. All excavating must be done in a manner which will not pool water and will keep the site dry until the track and drainage work is finished.

11. All excavating shall be done during "straight-time" working hours, unless otherwise ordered by the Engineer.

Fig. 4. Specifications must be clearly written and leave no room for doubt in the minds of the bidding contractors

Interior of Milwaukee warehouse shows equipment and utilities that are part of the author's responsibility

the performance desired on all the Cut and Fill work.

All other work activity should be similarly covered by sections of the specs or by parts of sections, to the end that all trades for all parts necessary to complete the job are fully informed.

Care should be taken not to cover trade practices and procedures. It is not necessary to tell a carpenter how he should drive a nail or saw a board, nor how he should hang a door or window, unless it is not standard practice and there is something exceptional about it. This is needless and takes space.

Space can further be saved and brevity enjoyed by incorporating reference designations with which people in the business are fully familiar. By this is meant reference to A.S.A., A.S.T.M., C.S. Fed. Spec., and other similar published agency specifications.

To illustrate, architects will cover cement by saying "Cement shall be Portland cement made in accordance with specifications of A.S.T.M. serial designation C-150-56, Type 1," instead of repeating all that is contained in this specification. You and everyone concerned will know what is wanted, and, if you do not, you will get and read the A.S.T.M. specs. By this reference American Society for Testing Materials specs become a part of your specs.

An effort has been made to help plant engineers in specifications appreciation, so they will know what specs are, what they should include, and what to look for in a good set of specs. This is a very broad subject, and analysis and experience alone will improve the end product. The perfect set has not yet been written, but the closer plans and specs come to perfection, the easier it becomes for the owner, the contractor, and everyone concerned to complete the project most quickly and at the lowest cost. **End Part II**

Watch for Parts III, IV and V

Section III tells how to select bidders, instructions on bidding, and proposal forms.

Section IV covers analyzing bids, agreement forms, and signing the contract.

Section V discusses the problems that arise in the field during the construction period, progress reports, final inspection, and obtaining approval of completed work.

DUAL-PURPOSE STRUCTURE
Combines Plant Use With Nuclear Protection

By FRANK ORLANDO, Walter Kidde Engineers-Southwest, Inc.

DURING THE 13 years since the nuclear explosion over Hiroshima the need for specially designed personnel shelters for industrial plants has been broadly accepted, but, generally nothing has been done to move the idea off the drawing boards.

An answer to this problem is to be found in the recently completed dual-purpose structure built for a large industrial plant.

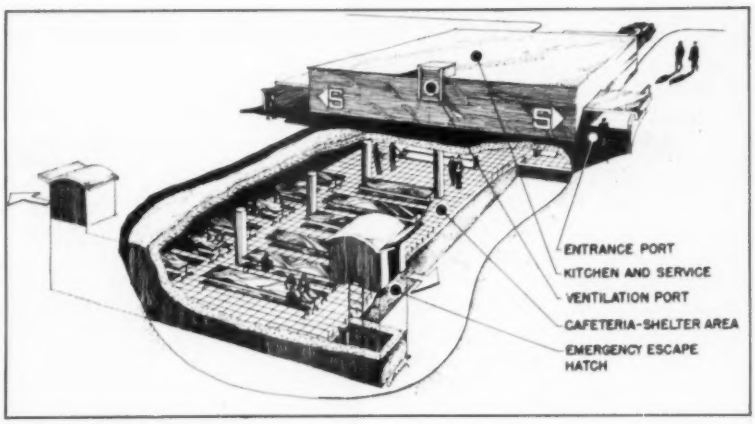
On this project, Walter Kidde people were called in to design and construct a structure providing the following basic features: Complete protection for plant personnel against a possible future nuclear blast in a structure designed for everyday use as recreation, cafeteria and meeting space.

The accompanying cutaway sketch illustrates a similar building located within the confines of an industrial plant, and designed to function normally as an employees' cafeteria and assembly area. However, in time of emergency it will be used as a shelter from any disaster, from a local plant explosion to a full-scale nuclear bombardment. It points out what things should be considered in such a structure.

Designed to provide complete food preparation and serving facilities for a 300- to 400-man plant force in two or three serving periods, the dining space also functions as an employees' meeting room.

The building is arranged on two levels. At the lower level, completely surrounded by a thick reinforced concrete shell, is the shelter area, including mechanical and emergency power equipment, emergency water well, conventional and chemical toilets, as well as the dining and serving area.

Entrance to the shelter area is by either of two concrete-enclosed stair towers. The entrance ports are protected from debris by concrete canopies and wing walls. Actual closure of the bomb shelter area occurs at the lower level, where a heavy blast-and-radiation-proof door can be rolled into position and secured by means of an inflatable gasket.



Sketch illustrates how such a structure could be used for everyday plant services. It can, however, also serve as a shelter in case of an emergency.

Emergency escape hatches at the opposite end of the dining room provide an alternate means of exit.

The above-grade section of the structure contains the food preparation facilities, complete with cooking equipment, food refrigeration and storage areas, kitchen employees' facilities, delivery and disposal area, and mechanical equipment serving these areas. These spaces by their nature require an extensive ventilation system and direct accessibility to delivery service.

For the above reasons, and because the kitchen element is not suitable for accommodating large groups, it is not practical to incur the additional expense of locating this element below grade, at the level of the shelter area. A flat site is presupposed for this example. Given sloping or rolling terrain, it might be possible to provide at-grade access to the service area, and at the same time have the benefit of protective earth cover for this element.

In order of effectiveness, lead, steel, concrete, earth, and water are the materials that provide the best protection against radiation. In general, the type of structure most resistant to effects of blast and radiation is dense, monolithic material.

Structural concrete framing, with poured concrete walls, has stood up best in testing carried out in Nevada. Steel framing which is sheathed with a well attached precast or poured reinforced concrete skin will stand up satisfactorily. A lightly attached masonry wall, on the other hand, will provide almost no protection inside the building, and the brick or tile themselves become hazards as missiles throughout the area.

The minimization of flying missiles caused by fragmentation of brick, tile, glass, pieces of wood, and metal is most important in the selection of materials. In addition to causing considerable damage to structures and personnel, large quantities of debris could damage or block an entrance to a shelter, thus making rescue and fire-fighting operations extremely difficult.

In view of the various kinds and duration of occupancy possible in such a building, the ventilation system must be designed to function efficiently and economically to suit each condition. When outside air is not contaminated, it would be possible to route air through conventional filters.

If outside contamination were

(Continued on page 216)

Lubrication and Maintenance Hints for HELICAL GEAR SPEED REDUCERS

By W. L. BYLER, Gearing Division, Westinghouse Electric Corporation, Philadelphia, Pa.

BENEFITS OF A high-speed high-efficiency motor drive can be obtained while meeting the lower speeds called for by the driven machine through the use of speed reducers.

In general, there are three speed stages available, giving approximately the following speed reductions: single (1.25:1 to 10 to 1), double (11:1 to 75:1 to 1) and triple (80-360 to 1). Available horsepower ratings run from fractional to about 1000 on standard commercial units.

Catalog horsepower ratings at unity service factor are for continuous 8 to 10 hour service per day under uniform loads, allowing 100 per cent momentary overloading. Since all jobs do not fit neatly into this classification, there is a need for service factors other than unity.

Transmissions that must operate under more severe conditions, such as 24 hours continuously, reversing service or shock loads from driven equipment, need greater reserve capacity than steady service, uniform loads. This means a service factor larger than one since the required horsepower of helical speed reducers is the product of actual running horsepower and the proper service factor.

There are nine service factor classifications, running from 0.50 to 2.50. Selecting a specific service factor depends on (1) the type of prime mover, (2) the kind of load, and (3) the hours per day normal operation.

A thermal rating indicates the ability of a reducer to rid itself of heat generated within the unit. Single-reduction units are most sensitive to thermal ratings, double-reduction units are critical in the lower ratios and less sensitive in the higher, and triple-stage units are virtually unaffected by thermal ratings.

Fig. 1. Helical gear speed reducer is connected to a belt drive in coal cleaning plant. This is just one of numerous applications where reducers are used.

In a single-reduction unit with a pinion driving the main gear, the large gear rotates at high speed, whipping up oil in the reservoir to lubricate the gear teeth, and oil splashed against the reducer housing is caught in channels and fed to bearings. The heat from turbulence, plus the heat from the shearing and working of the oil, especially at high speed, must be given off by the surface area of the housing. Large gear rotation is much slower in a triple-reduction unit; hence turbulence is reduced and the result is less heat generated, making the thermal capacity of the unit cease to be a problem.

Manufacturers give thermal ratings for each of their units, but service factors should not be applied to thermal ratings. Thermal ratings are related only to the actual horsepower transmitted, regardless of whether load is shock or nonshock, and they indicate the actual horsepower that can be handled for long periods (over 3 hours) without overheating or supplementary cooling.

Maintenance of a modern helical speed reducer is not a problem if the unit is selected in ac-

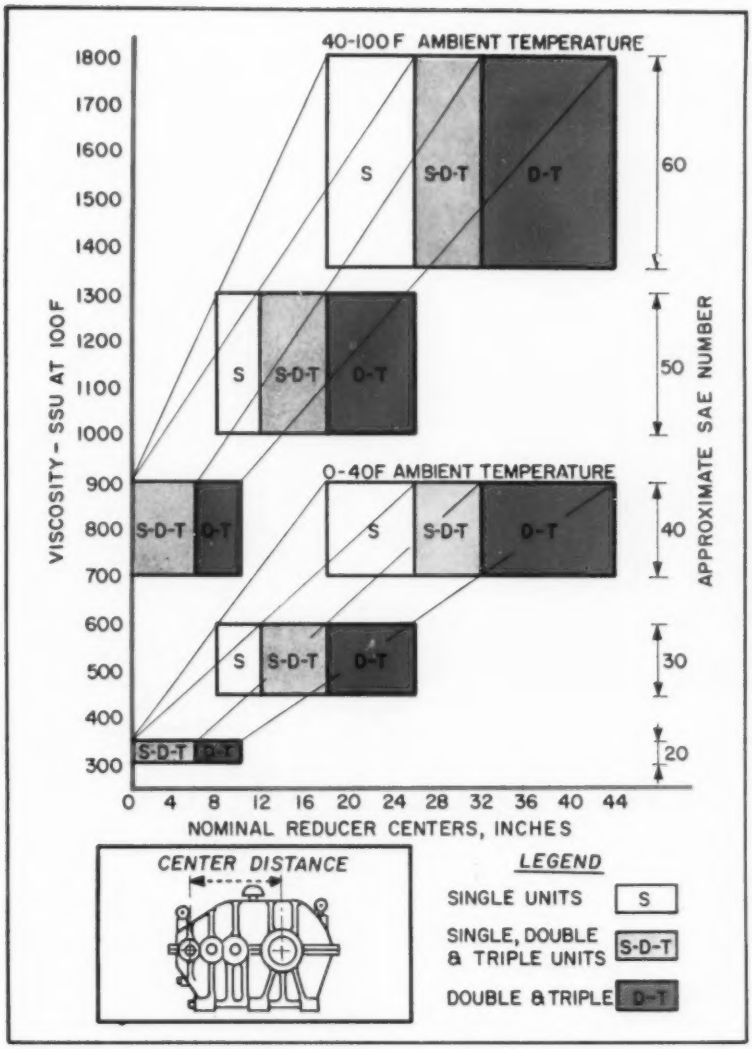


Fig. 2. Proper viscosity selection for speed reducers is important but do not overlook (1) maintaining oil level, (2) changing or filtering oil when needed.

cordance with manufacturers' recommendations and is installed properly. Provide a good foundation, then grout the unit in place after carefully aligning the shafts and leveling the reducer. Grouting prevents springing or shifting when the foundation bolts are tightened. Use a single base plate to support the motor and reducer as a unit.

Flexible couplings are usually used in connecting shafts, with enough end float between the motor and reducer shafts to permit the motor to operate in its true magnetic center. The coupling fit on the shaft should be tight, but not too tight to the extent that hammering is necessary.

Routine maintenance after installation is generally confined to maintaining proper oil level in the reducer and inspecting the oil to see that it is clean. Most reducers are now equipped with a filter-type breather, but the metal meshing in it should be kept clean and soaked with oil.

Follow the manufacturer's recommendation for the correct oil level or oil capacity. If the oil appears clean, and the oil level is correct, no further attention is generally needed. A shallow pan painted white is useful in inspecting the oil condition. If possible, locate a petcock under the high-speed pinion. Since oil turbulence is least at that point, dirt will settle in this relatively quiet zone.

Frequency of inspection depends to a great extent on the location of the reducer. A maintenance timetable can be guided by the simple oil test described above. Reducers in unusually dirty locations may need oil changes every week. But others installed in clean, dry and protected areas may not need attention for six months to a year.

When intermittent overloads or unusual temperatures cause the oil to heat and cool quickly, sweating on the housing walls results and forms sludge which contaminates the oil. This necessitates more frequent oil changes.

When a reducer is first placed in service, it should be filled with the proper lubricant and run for no more than two weeks. At the end of this period it should be drained and refilled with new oil, or the old oil should be filtered. Flush the reducer housing with a light flushing oil to remove any dirt or foreign metal particles since these small particles will damage gears and bearings if left in the unit. It is well to repeat this flushing precaution several times before settling down to a longer oil-change interval.

General recommendations about lubrication are difficult to make. Operating conditions, size, type and ratio affect a lubrication guide. For ordinary service, a high-grade, straight mineral oil should be used. If operating conditions are severe, use a mild extreme-pressure lubricant but avoid extreme-pressure lubricants of the corrosive type, and do not use grease or graphite in units designed for "splash" or oil-bath lubrication.

Operating temperature of the oil inside the reducer housing should not exceed 180 F, nor drop below zero Fahrenheit. If limits are exceeded, consult gear manufacturer or lubricant supplier.

The chart, Fig. 2, is a general lubrication guide for normal plant conditions. Gear units equipped with antifriction bearings are considered standard, but reducers equipped with sleeve bearings require a compromise in lubricant viscosity to provide oil thin enough for bearings, and yet with sufficient body for the gears. **End**

Six months after installation, all asphalt tile had to be removed from this dishwashing area. Dampness caused the tile to loosen.

By MARTIN O'SHAUGHNESSY
Administrator, Food Services
Radio Corporation of America

PLAN FOOD SERVICES FOR LOW MAINTENANCE

PLANT ENGINEERS, in general, are literally snowed under by service requests from their plant food service activity. It may be that clogged drains, undersized service lines, faulty powered equipment, hazardous electrical connections, or any of a multitude of other similar conditions are the cause of these constant headaches.

All too frequently the unprofessional basic planning that goes into plant food service results in these constantly recurring and expensive maintenance charges. In addition major construction projects are sometimes necessary to correct bad conditions. Example: tearing up a masonry floor to re-size an inadequate drain line or to eliminate a bad leakage problem. Professional food service facilities engineering will exterminate these bugs which contribute to expensive maintenance.

In too many instances, when the requirement for developing plans for a food service activity is decided upon, we find that the chore of working up these plans is handed to someone in the Plant Engineering Section, probably a man who never has had any previous experience in the field of food service equipment engineering.

When this happens a local food service equipment dealer is generally called in for advice and guidance. He is asked to submit a suggested layout plan. It is normal and yet obvious that the dealer will submit a plan and equipment specifications, which will be advantageous to his firm. He will generally over-equip in these plans and will recommend items of food service equipment of which he is the local franchise holder. There are wide variations in pricing and application of such equipment and these are factors which may exert heavy pressure on your capital budget or appropriation.

Another method commonly resorted to is that of employing the engineering services of national catering firms. Such caterers sell their services to a given plant when local management decides not to operate the food service activity with company employees. When this is the case, the catering firm generally has a standing arrangement with a food service equipment dealer who does the actual engineering work.

The catering firm makes operational suggestions which are incorporated into the plans and specifications and which tie in with the individual caterer's operational procedures. It is noteworthy that these procedures vary considerably between caterers and what is a highly acceptable equipment layout to one is totally unacceptable to a competitor.

Still another method, which finds favor in new plant construction and is used by many companies, is the designation of an architectural-engineering firm to do the entire job of engineering a project. In this situation, one of

Stainless steel clad, sectional, walk-in refrigerators such as these are functional and flexible. Get professional advice before specifying equipment of this type.

the larger food service equipment dealers or manufacturers will be selected as a "sub" and will work up food service plans and specifications for the project.

Here again, the probability of over-equipping and selection of franchised food service equipment is apparent.

In view of the varied questionable methods used in obtaining food facility engineering services, it is apparent that a more realistic and objective approach to the plant food service facility problem is a prime requisite of any capable plant engineering section.

Planning New Facilities

Just as soon as plans are conceived for a new plant in which a food service facility is contemplated, it is time to call in a team of experts made up of a qualified food facility engineering consultant and the company food operations coordinator. For this is the crucial stage in planning when space requirements and location are most effectively determined. In too many instances, the food facility and its location is treated as an afterthought. As a consequence, the cafeteria is tucked off into a remote corner of the plant, totally unsuited to its effectiveness. This decision creates many costly mechanical problems, such as necessitating long service line runs from the boiler room or from main feeder lines, with resultant loss of efficiency. More important, from an operational point of view, the distant or remote locations result in a substantial loss time factor in getting employees to and from the food service activity.

Food Facilities Engineering Consultants—There are any number of qualified food service consulting firms and individual consultants listed in every major city's yellow pages. These firms offer varied and sundry affiliated food consulting services. It is recommended that extreme care be exercised in the selection of the firm to implement the engineering requirements of your project. Visits to completed projects handled by a consultant under consideration will give you a device for measuring the quality and scope of the services to be expected.

Food Facilities Engineering Society—Sometime ago, the Food Facilities Engineering Society was organized on a national level. This society's membership is comprised of outstanding food service designers and consultants, whose professional backgrounds are most impressive and represent many years of experience in the field of food service engineering. The limited membership in this society is maintained to insure continuance of the standards upon which the society was founded.[1]

From personal experiences with two members of this society, I can recommend them for their integrity and professional know-how. The society's entire membership is crusading for better food service engineering and understanding of the common problem.

Operations Coordinator

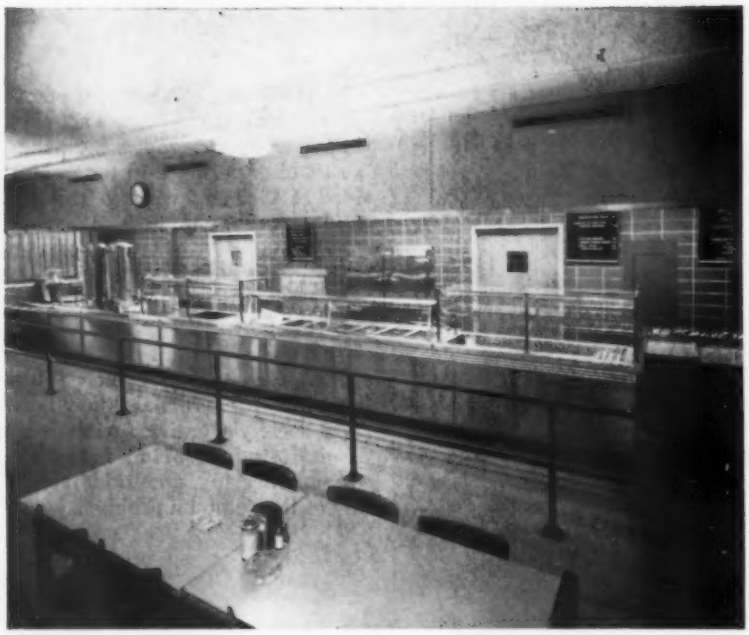
Inasmuch as the basic or functional responsibility for operating the completed food service facility will be in the lap of the operations coordinator, his opinions on layout, equipment, materials, and sound operational practices will be of prime import during all phases of the planning cycle. His suggestions and recommendations must be incorporated into the food service plans to result in the operating effectiveness desired of the facility.

These suggestions and recommendations should, of course, include current thinking on new methods and improvements in equipment being rapidly developed in the industrial food service field. Such items as self-service cafeteria counters, improved steam, gas, and electric cooking equipment, adequate usage of garbage grinding equipment—application of new methods of soiled dish transfer by means of powered conveyors are but a few of the recent equipment changes.

Modernizing Present Facilities

Today, in many older plants, changes in employee eating habits, together with the higher level of living standards, make it im-

[1]A mimeographed list of members of the Food Facilities Engineering Society will be sent to all interested readers of Plant Engineering upon request to The Editor, 308 East James St., Barrington, Ill.



Good looks cost little more, if any, than mediocre appearance. These rust-colored ceramic wall tiles blend harmoniously with the beige tiles on dado treatment.

portant to renovate inefficient and dingy plant food service facilities. The maintenance expense to keep the old facility going can be terrific and would be enough to justify a decision to revamp the food service facilities.

There are situations in which only minor renovations involving the replacement of some small equipment will do the job. Or, perhaps, a paint job, some new lighting fixtures, or new furniture will suffice. These improvements are generally handled locally by an interested employee and can be artfully and successfully accomplished. However, care must be exercised that these minor improvements will tie-in with any potential, major renovation program contemplated in the reasonable future.

Of greater importance and normally involving a sizable capital outlay is a major renovation. This demands exceptional professional skill in planning because this type of project can be real messy. It requires even greater and more detailed engineering than that which goes into new building construction planning. The added burdens stem from the fact that the food activity must continue operations, if only on a limited basis.

Write Quality Into Specs

Any construction plan is only as successful as the quality that goes into its written specifications. This definitely holds true in the specs for a food service facility, which may reflect high quality when the money is readily available or low quality when money is tight.

Even when a tight money situation is prevalent, extreme care must be exercised in the writing of specifications to insure that quality standards in materials and equipment are maintained. The use of stainless steel in the fabrication of counters, tables, sinks, and other items of food service equipment, is highly desirable. If a practically impervious material such as this is not used your maintenance expense will start within six months after installation.

From a practical point of view, it would be much better to temporarily defer the purchase of some equipment items from the equipment contract rather than sabotage the original plans. The omitted equipment might then be purchased at a future date through normal budgetary procedures.

Introduction of stainless steel, some years ago, caused a welcome revolution in the food service industry. Prior to its development, other materials were used in the fabrication and manufacture of food service equipment. Such methods of surfacing left much to be desired. The action of food acids and cleaning detergents on many of these surfaces was most harmful. The chipping and scratching of and the resultant rusting and deterioration which followed has discouraged the continued use of such surfacing.

Even though stainless steel is the nearly ideal metal for most food service applications, it, too, has its limitations. Excessive heat will cause it to stain and become unattractive. Further, extremes of heat will cause it to warp in certain applications. So while this alloy may be used most effectively in 99 per cent of food service applications, its use in the construction of ranges, broilers, toasters, and similar types of equipment is not recommended.

Generally speaking, your professional food facilities engineer will specify twelve or fourteen gage stainless for counter tops, sinks, shelves, and tables, etc., and sixteen to twenty gage stainless for panels, facings, and similar application where there is no heavy loading concerned.

Floors and Walls

Quarry tile floors for the kitchen and adjacent work and storage areas are recommended for their wearability. Concrete floors deteriorate rapidly from the action of food acids and cleaning detergents and present both unsightly and unsanitary conditions requiring constant maintenance. Greaseproof asphalt and the new vinyl tile floor coverings do not hold up well in areas where normal cooking and dishwashing operations create a wet condition. This excessive moisture causes the tiles to curl and crack after a time.

Use of ceramic tiles for walls in the kitchen and preparation areas is the practical solution. It reduces the daily housekeeping chore, eliminates the painting cycle and answers the requirements for sanitation standards.

(Continued on page 214)

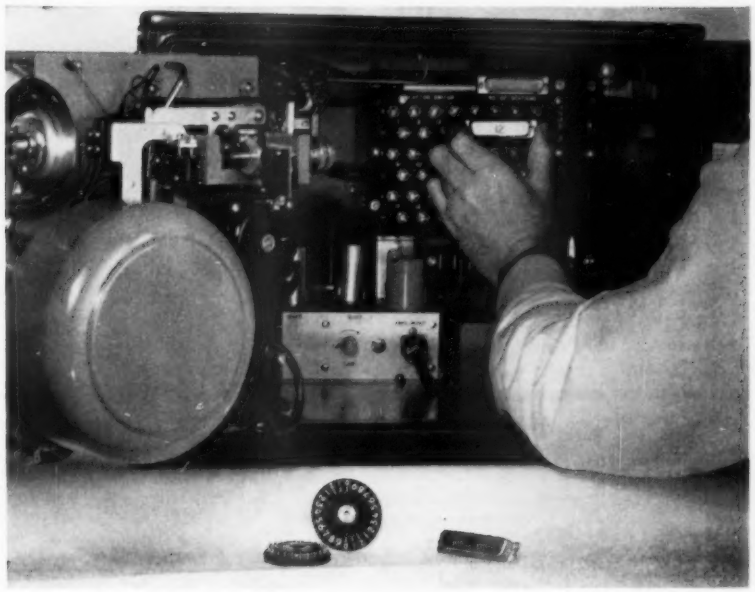


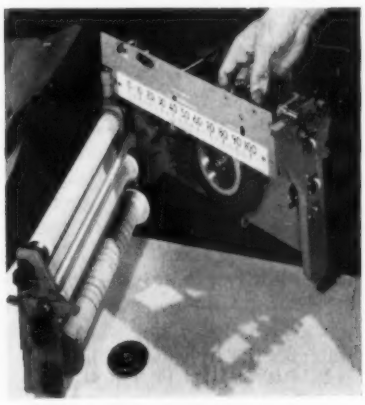
Fig. 1. Substitution of one plug-in unit for another such as those marked "12" and "6" shown at the right, in effect, rewires instrument to suit requirements.

QUICK-CHANGE POTENTIOMETER

Instrument Has Time-Saving Plug-In Unit

MULTIPLE POINT recording instruments account for a sizable share of plant instrumentation because of their ability to monitor as many as twenty-four different points in rapid sequence. However, the flexibility of these instruments has been seriously hampered by inherent design factors. Instruments have been designed to handle a specific number of points, a specific range, and in the case of temperature recorders, to handle a specific type of thermocouple.

Fig. 2. A change of dials is one of the steps for altering number of readings.



A completely new approach to the design of multiple point recorders was considered. The resulting design offers complete flexibility in varying the number of points to be monitored, desired ranges and types of thermocouples. Any of these factors can be changed at will by the operator of the equipment using simple quick-change, inexpensive parts.

Should the instrument be measuring, for example, six points, and additional work load requires that twelve points be under scrutiny, the operator need only change a plug-in unit, see Fig. 1, and replace a dial indicator, see Fig. 2, and print wheel which is mechanically geared with the selector switch. No new selection switch is needed, no soldering is required, and no fitting of the components is necessary.

Range changing on a specific unit requires only the insertion of the proper range clip. A change in the type of thermocouple or transducer being used is easily accommodated by replacing a terminal block which has the cold junction compensation integrally wired. Inserting the matching range clip and scale plate, which are included in the thermocouple change kit, completes this simplified procedure.

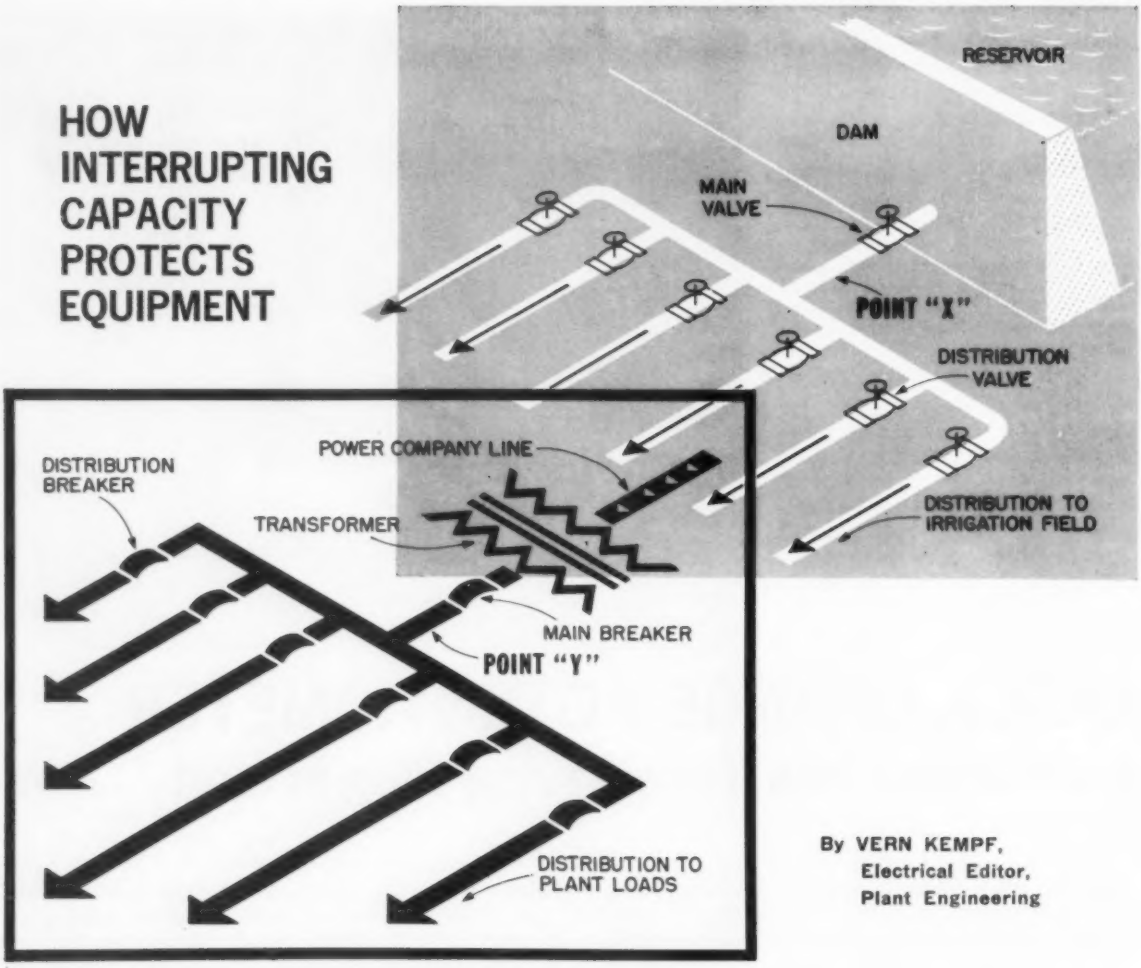
The instrument mounts in a standard 19-in. relay rack, and is available for panel or wall mounting. It can be used to measure any input from thermocouples or transducers, including voltages, frequencies, temperatures, pressures, and pH.

Other design features include alarm switches, internal illumination, chart tear-off, high resistance to shock, vibration and corrosion, low spare parts inventory and accuracy of ¼ per cent. **End**

Additional Information

If you would like more information about this potentiometer, write to the Editor, Plant Engineering, 308 E. James St., Barrington, Illinois, or indicate "Potentiometer" on the post card in this issue.

HOW INTERRUPTING CAPACITY PROTECTS EQUIPMENT



"DAM" YOUR ELECTRICAL SYSTEM

By VERN KEMPF,
Electrical Editor,
Plant Engineering

RESULTS of a recent survey on electrical protection equipment indicated that some of our readers are not fully acquainted with the meaning of the term "interrupting capacity."

One of the questions in this survey asked, "What is the maximum interrupting capacity of your protective equipment at the highest voltage at which electricity is distributed within your plant?" The respondent had the option of giving his reply either in amperes or mva.

Replies of 60, 100, 200, 400, and 600 amps indicate that these respondents believed that the continuous current carrying capacity of the fuse or circuit breaker was the "interrupting capacity." In view of the fact that even very small circuit breakers and fuses have interrupting capacities in excess of 10,000 amps, it seems reasonable to assume that this segment of our readers did not know the difference between "continuous current carrying capacity" and "interrupting capacity."

The selection of a circuit breaker for a power system depends upon many factors. The current which the breaker is to carry under normal operating conditions, the maximum current it may have to carry momentarily and the current it may have to interrupt at the voltage of the line in which it is placed.

It is always necessary to determine the maximum current that might occur on a system, due to a fault, so as to select a breaker having an adequate momentary rating.

The importance of this is recognized by the National Electrical Code which states, "Devices intended to break current shall have an interrupting capacity sufficient for the voltage employed and for the current which must be interrupted."

There are many similarities between a simple irrigation system and a common electrical distribution system. The irrigation system has a main valve that controls the flow of water from the reservoir. This flow is directed into a distribution system and each tap has a distribution valve controlling the flow of water to the irrigation field.

In the electrical circuit we have

the main circuit breaker that controls the flow of current from the power company's lines. This current flow is also directed into a distribution system and each tap is similarly equipped with a distribution circuit breaker to control the flow of current to the load.

In the irrigation system, the distribution valves regulate the flow of water into the irrigation channels and the total flow of water passes through the main valve. This valve operates easily against total flow.

If the pipe should suddenly break at point "X," the rate of flow would rise very rapidly until it reached a point restricted only by the size of the pipe leading from the reservoir. If the main valve is not capable of shutting off the flow of water, under these emergency conditions, considerable damage will be done to the crops planted in the valley. The extreme pressures, of this unrestricted flow, might wreck the valve.

In the electrical circuit, the main circuit breaker must be capable of stopping an unrestricted flow of current. Normally the current passing through each of the distribution circuit breakers is limited by the characteristics of the load. The total flow of current passes through the main breaker and this is the basis for determining its continuous current carrying capacity.

If a short circuit should develop at point "Y," there would occur an almost unlimited flow of current. This would be restricted only by the impedance of the transformer connected into the reservoir of power represented by the power company's line. If the main circuit breaker is not capable of shutting off the flow of current under these emergency conditions, considerable damage to the equipment up to the point of the fault will occur and the main breaker will probably be severely damaged.

Inability of the main breaker to stop the high rate of current flow will result in loss of production and cause additional expense in repairing the damaged equipment.

Naturally, you do not want to wait until the pipe breaks to find out if your main valve will stop the flood. You can determine the maximum possible fault current on your system and the interrupting capacity of your breakers by consulting with your power company, and the manufacturers of protective equipment.

Remember, the fact that your main switch carries the plant load without trouble is no guarantee that it will successfully protect life and property under short circuit conditions. **End**

HOW TO STOP WELDING GAS WASTE

By WALTER JACOBY, Maintenance Supt., S.P.D., I-T-E Circuit Breaker Company, Philadelphia, Pa.

LEVER OPERATED shut-off valves, currently used to control the flow of argon gas and cooling water to welding torches are generally a heavy maintenance problem. The operator hangs the torch on the lever to shut off the flow of argon and water to the torch. Lifting the torch turns the argon gas and water on.

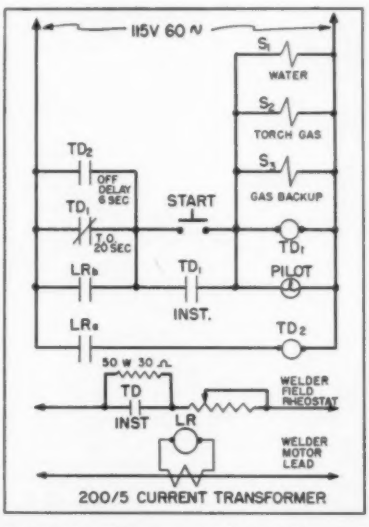
If the operator does not hang up his torch when not welding, gas and water continue to flow contributing to waste. If a second gas line is used for gas back-up, gas is wasted, as this line is manually operated.

Gas saver circuits, used in our plant, not only save gas and water but are fail-safe and do not depend upon the operator for proper use of the equipment. Components are contained in a small box with the exception of a "start" button that is mounted on the welding torch.

Pressing the "start" button on the torch, energizes solenoids S1, S2, and S3, allowing water and argon gas to flow to the torch. Solenoid S3 allows gas to flow to the gas back-up if it is used. A pilot light provides visual indication when the solenoids are energized.

Time delay relay, TD1, is set for 20 sec and if the operator has not started to weld within this time period, the solenoid valves close, stopping the flow of gas and water. This time delay period is set to allow the operator sufficient time to put on his shield and get set to weld.

If welding begins within the timed period, load measuring relay, LR, senses the increased current drawn by the welder drive motor and contact LRa closes to energize TD2. Contact LRb also closes, to maintain a circuit to the solenoids after the timed contact TD1 drops out.



Solenoids, timers, and pilot light operate on 115 volts. Load-sensing relay LR is a 0 to 5 amp overcurrent relay.

When the operator stops welding, time delay relay TD2 energized by contact LRa drops out. Contact TD2 operates on "off-delay" and opens six seconds after welding stops. This contact maintains a flow of gas and water to cool the torch and wire.

In the event the operator attempts to weld before the flow of gas and water begins, a second contact on TD1 prevents the welder from generating until the "start" button is operated.

The gas saver unit reduces water, gas and wire that is usually wasted using manual control methods. Heat fatigue on torches will be reduced as the six second cooling period is assured after each operation.

Total cost of materials for the gas saver unit amounted to $250. Labor to build and install the unit have been estimated at 48 manhours. These costs are rapidly recovered through savings in gas. **End**

Recovering heat without encountering corrosion was the problem faced by plant engineering at American Thread Co. This article tells how they accomplished it and paid for the job in a year and a half. . . .

GLASS HEAT EXCHANGERS GIVE FAST WRITE-OFF

AMERICAN THREAD Company's plant in Sevier, N.C., was built in 1952. It is a dyeing and finishing plant—here the thread is wound into various gages for domestic and industrial use, it is bleached or dyed, packed and shipped.

For its dyeing and bleaching operations, the plant can use up to three quarters of a million gallons of hot water a day, although this figure fluctuates quite drastically depending upon operations within the plant.

During the winter of 1954-55, just after the plant had expanded operations, it became apparent to the engineering staff that something had to be done to relieve the high peak loads on existing boilers supplying steam for hot water used in their processes.

By utilizing the heat of waste dye liquor through a heat recovery system, they knew they could sufficiently raise the temperature of incoming fresh water to relieve the load. The problem was: what heat recovery system should they use?

"We considered two types of systems," said A. Keith Pooser, chief of the general engineering staff for the company. "The open-pit type and shell and tube heat exchangers. The open pit, however, would have required an extremely large and deep concrete pit, considering the amount of fresh water to be heated.

"During our investigations, we studied many

Here, Merrill V. Davis, Plant Engineer at American Thread Company's Sevier, N. C. plant explains how 4-in. glass pipeline carries off corrosive waste dye liquor from heat exchanger. Waste liquor that is too cool is discarded to the sewer.

types of shell and tube heat exchangers. Many of them were eliminated because of the corrosive nature of the waste dye liquor. It contains both alkalies and acids." It was finally decided that Pyrex glass heat exchangers would fill the bill.

These glass heat exchangers are 50-sq ft units that can be mounted vertically or horizontally, in series or parallel. They consist of a 6-in. glass shell with twenty-six ¾-in. tubes in the bundle. The tubes give over-all heat transfer coefficients as high as 195 Btu per hr per sq ft per deg F; they can withstand a temperature of 375 F and a maximum pressure of 20 psi. Maximum temperature on the shell side is 200 F.

In August, 1956, American Thread installed the largest single system of glass heat exchangers in the country. Sixteen 50 sq ft heat exchangers were stacked in series four high, and connected in parallel four across.

American Thread's engineers came up with several unique ideas in the installation. They designed an intricate fresh water heating system whereby the fresh water passes once through the 10-ft length of the heat exchanger shell, with its temperature raised an average of 38 F, and is discharged into the main line leading to the hot water system.

Waste dye liquors are fed by gravity into a pump which passes them at 20 psi through the parallel connection to the heat exchangers. The waste then passes through the tubes of the four units hitched in series and is subsequently pumped out to the waste trench.

Another innovation by American Thread engineers is a recirculating system that feeds the waste back into the heat exchanger system if it is still hot enough to be utilized for efficient heat recovery.

"A special valve arrangement," said Mr. Pooser, "devised by a member of our engineering staff, enables us to discard any waste below an uneconomical temperature on one side of a partition in our drain trenches, and to save the hotter waste on the other side, where it is dammed up at a central collection point and pumped through the heat exchanger."

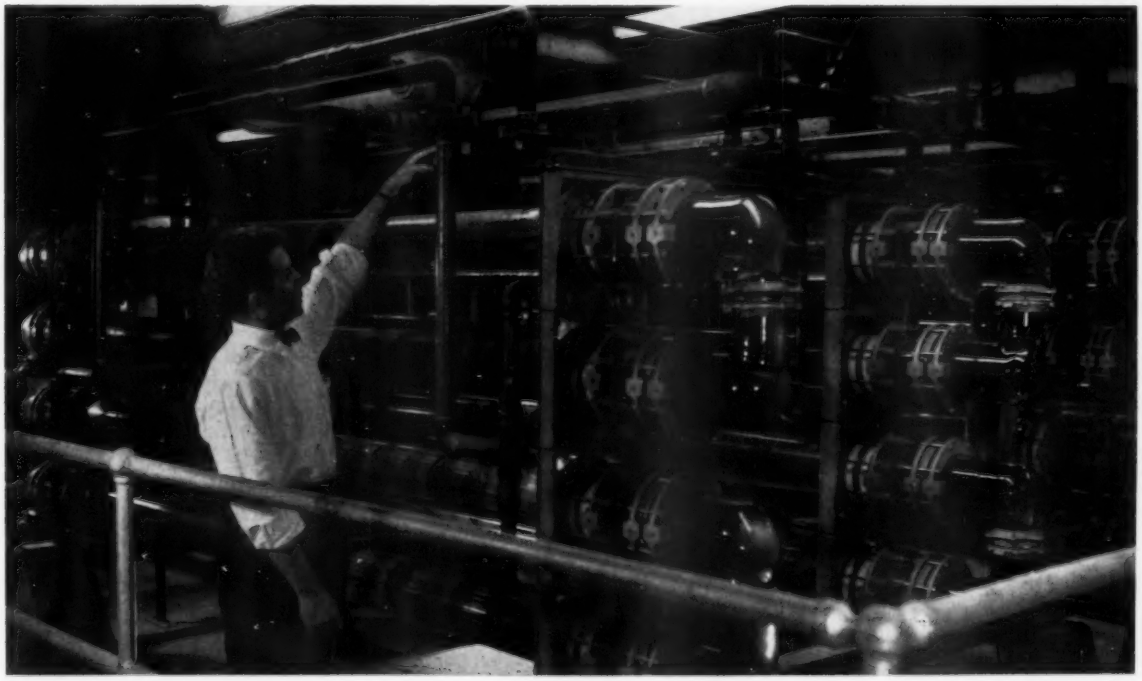
Plant Engineer M. V. Davis has this to say of the heat exchanger system, after a year and a half of operation: "We set up these heat exchangers to run without supervision, through a special series of bypasses and regulatory valves, and that's just what they have done since they were installed. We don't have a man assigned to watch the system and we don't need one.

"Since we started operation, we have had no maintenance on any of the 16 heat exchangers, nor on the glass piping conveying the dye liquor to and from the system. The system has probably handled half a billion gallons of water and dye liquor, and it's still as clean and sparkling as the day we put it in.

"With our current set-up, we can rest in case of tube breakdown. The parallel-series hookup would enable us to keep the system going while taking out an exchanger to repair it. After some basic instruction from a representative of Corning Glass in the handling of glass, our men were able to install the entire system without trouble."

By lowering the load on the boilers and paring fuel consumption, the heat exchangers paid for themselves in savings to American Thread Co. during their first year and a half of use. **End**

Design engineer Edison Westall explains intricate fresh water inlet system. Copper piping carries fresh water away from heat exchanger after it has run once through jacket of the exchanger. Water temperature is raised about 38 deg.



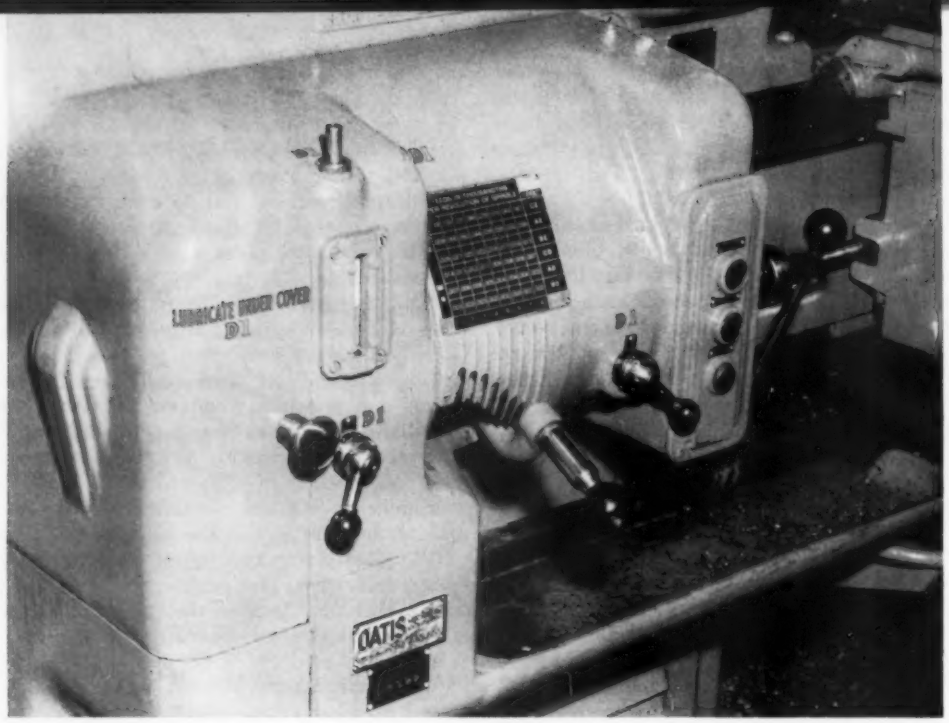


Fig. 1. Decalcomanias are located near lube points, showing type and frequency of lubrication needed.

CODED LUBRICATION SYSTEM

For Good Control, Minimum Supervision

By R. C. GARRETSON, Westinghouse Electric Corp., East Pittsburgh, Pa.

MAINTAINING CORRECT lubrication of machines in a manufacturing plant presents a major problem in training and supervising the personnel involved. The problem is further complicated by lubrication cycles that may vary from one day or less to one year or more, and by the many different lubricants required.

Many plants have reduced the supervisory problem somewhat by employing a relatively small force of oilers to service all equipment, rather than attempting to train and supervise each machine operator to do the job. However, the high rate of turnover of relatively unskilled labor usually employed for this purpose demands a simple, easily-taught system that requires a minimum of supervision and yet contains adequate controls.

The use of a coded lubrication system fulfills these requirements.

Basically, a system of coded lubrication consists of the use of markings differentiated by shapes, colors, numbers, or letters, or a combination of any of these, for the identification of all lubricants used in a plant. These markings are applied adjacent to the lubrication points on each piece of equipment.

Larger markings are affixed to the containers in which the lubricants are shipped, to all intermediate containers (such as lubesters, oil cans, grease guns, etc.) and to lube points where visibility is limited. It is only necessary to match the identification marks on the container, the lubricating equipment, and the fitting to assure delivery of the right lubricant to the right place.

This system can, of course, be correlated with other markings to indicate frequency of application, or to indicate a reference to a master set of instructions which specifies the total number of lubrication points involved. The latter idea will help to assure that all points are serviced. In addition, suitable markings can be used to identify drain and fill points, circulation gages, level indicators, covers that must be removed to expose lubrication points, etc.

Any system of coded lubrication, to be completely acceptable, must meet the following requirements:

1. Must be inexpensive
a. Cost of material
b. Cost of application
c. Cost of maintenance
2. Must be simple
a. Limited number of easily recognized colors
b. Limited number of easily recognized shapes
c. Combinations become confusing
d. Specification numbers
e. Key numbers or letters

3. Must be flexible and adaptable to the needs of various departments and plants

4. Must be easily distinguished under all conditions

a. Inadequate light
b. Different light sources
c. Color blind personnel

5. Must be permanent

a. Impervious to lubricants, solvents, and water
b. Resistant to abrasion and scuffing.
c. Resistant to fading
d. Resistant to extremes of temperature
e. Visible when covered by dirt or paint

6. Must be applicable to all surfaces

a. Rough or smooth
b. Flat or irregular

Pressure-sensitive tapes, although inexpensive and easy to apply, are frequently unsatisfactory for this purpose for two reasons. First, they do not adhere well to rough surfaces. Second, the adhesives used are not always impervious to oils, solvents, and water. Tapes are ideal, however, for the marking of original containers, where permanence is not an important factor.

Engraved tags are costly to apply and are prohibitively expensive. It is true that under certain light conditions they can be read, or at least located, even when painted over or covered with dirt. However, they are easily knocked or pried off, either accidentally or intentionally, and this could result in complete lack of lubrication at some vital points.

The use of shapes and colors has frequently been resorted to in the development of coded lubrication systems. However, there are too many different types and grades of lubricants to use in most plants to satisfactorily identify by colors or shapes. Combinations of one or both have been tried, but the confusion that results usually offsets the advantages.

Identification of the lube fitting with the particular brand name or specification number to be used is another possibility. This type of system lacks flexibility, and it would be a costly and difficult task to change all of the markings on each item of equipment and on the necessary lubricant containers, if it became necessary to change over to a different lubricant.

Special Decals Preferred

The system preferred by the author is similar to the one developed some years ago by a major automobile manufacturer, and recently introduced by one of the manufacturers of decalcomania transfers. It consists of the use of decals containing a simple number (or alphabetical) code printed in bold black copy upon a white background. This appears to give optimum visibility under a variety of light conditions, and the use of simple key letters or numbers permits extension of the system without losing its simplicity.

Decals, which were especially developed for this type of service, employ a special bonding agent. They show good resistance to lubricants, solvents and water, as well as to scuffing and abrasion.

In establishing a system of coded lubrication, the first step is to survey and list all equipment which is to be included in the program. Then, lubrication instructions or lube charts, similar to the one shown in Fig. 2, are prepared for each item of equipment, listing the parts to be lubricated, the lubricant to be used, frequency of application, etc.

Brand names or specification numbers may be shown on these charts, if desired, but opposite each one must be placed the code identification. Using these charts, the appropriate marking is affixed adjacent to each fitting on each machine, as shown in **Fig. 1.**

In the system used at the Small Motor Division of the Westinghouse Electric Corporation, the numbers refer to particular purchasing department specifications, while the letters specify the required frequency of application. The latter do not eliminate the need for proper scheduling.

A master key sheet, such as shown below Fig. 2, is used to show the approved specifications for each lubricant. **End**

Fig. 2. Typical lubrication chart for machine gives all needed information. Below, master key indexes decalcomanias with approved lubricant specifications.

Lathe, Hydraulic Duplicating — Type | Model No.: Pacemaker | Size: 16" - 20" | Lub. Spec. No.: 669

Manufacturer: American Tool Works Company | Used Divisions: AWP | Card: 1 of 1

Part	Lubricant		Application	Amount	No. of Fittings	Frequency of Inspection	Freq. Code No.
Headstock Reservoir	12239-300	3		Keep Filled	1	Chk wkly Chge 6 mo	W H
Oil Filter Rear of Headstock	Turn Handle Several Times Remove and Clean					Daily Yrly	D Y
Gear Box (A) and Carriage and Apron Plunger Pumps	9802-300	1		Keep Filled		Daily (B) Fill Wkly	D W
Power Rapid Traverse Gear Box	12190-5	7		Keep Filled	1	Chk Wkly Chge 6 Mo	W H
Hydraulic Reservoir	12239-150	4		Keep Filled	1	Chk Daily Chge 6 mo	D H
Tailend Leadscrews & Power Traverse Screw Bearings	9802-300	1		Few Drops	2	6 mo	H
Tailend Feed Rod Bearing Misc. Hand Oiled Parts (C)	12279-250 9802-300	33 1	Pack	1/2 Full	1	Yrly Daily	Y D
Replace Hyd. Oil Filter Cartridge					1	6 mo	H

Special Instructions: (A) Fillpipe inside swinging cover (B) operate plunger pumps several times before starting, (C) quadrant gear stud inside swinging cover, tumbler, cross slide, half nuts and lead screw (remove small set screws marked "oil" on carriage, etc.)

By | Date | Checked By | Date | Date of Latest Revision

Machine Lubrication Specification — Westinghouse Form 28778B

Oil Code			Grease Code		
(1)	9802-300	General Purpose Oil	(22)	12600-2	Hi Temperature Grease
(2)	12239-60	Spindle Oil			
(3)	12239-300	Heavy Med. Hydraulic Oil	(33)	12279-280	General All Purpose Grease
(4)	12239-150	Light Hydraulic Oil	**Frequency**		
(5)	12442-300	Way Oil	D	Daily	
(6)	9802-1000	Heavy Gear & Punch Press Oil	T	Two Days	
			W	Weekly	
(7)	12190-5	Gear Box Oil	M	Monthly	
(8)	5332-1	Gears & Pinions	Q	3 Months	
(8)	9826-3	Crankcase Oil	H	6 Months	
(10)	12573-31	Houghton Safe	Y	12 Months	

THIS CHART SIMPLIFIES YOUR JOB OF

By WM. G. STEINMILLER, Research Eng., Yarnall-Waring Co., Philadelphia

NORMAL SELECTION of a steam trap depends on the answers to two questions: 1. What type of trap can best be used? 2. What is the correct size of trap to use?

To answer these questions it is often necessary to make a detailed analysis of the trapping problem. Each type of trap has certain limitations. You can obtain a good knowledge of the best uses for any type of trap by a careful study of the manufacturer's catalogs.

Once you've decided on the type of trap you intend to use you must then determine the condensate load before you can choose the size of trap needed for the job. It is in this important step that the charts will be of help.

Trap catalogs tabulate or plot capacity-pressure relations. A quick study of any catalog shows that the capacity of a trap generally does not increase in direct proportion to the pressure differential across the trap. Such a study will also show that the body and pipe connection size are not true indices of capacity.

For trap selection purposes the load on steam-using devices is stated in terms of pounds of condensate per hour discharged by a device. Trap capacity is stated in the same terms. So if we know the load on a device, we can refer to the appropriate trap catalog and choose the size of trap needed.

The load characteristics of different devices vary widely. During start-up the load is usually heavy because the device must be brought from room temperature to its operating temperature. Also, air, as well as condensate, must be removed from the device. The quantities of both are likely to be large. While the condensate is forming at a rapid rate during start-up there may be a lower steam pressure at the trap inlet. This reduces the trap capacity when its load is a maximum.

When the system reaches its operating pressure, condensate formation may be relatively constant, or it may vary considerably, depending on the application. To compensate for some of these variables a factor of safety must be used as a multiplier of the calculated load to determine the final capacity to be used in "entering" a trap selection table in a catalog.

There are many methods to compute trap load. Generally, the calculations involve use of both formulas and tables. Charts eliminate use of formulas and most tables. All you need do is "enter" any one of the charts with the needed variables. By following the directions given you can, within less than a minute get the answer. The results obtained are well within slide-rule accuracy.

When heating liquids or solids with steam, the steam gives up its latent heat and condenses. The amount of condensate formed during this heating process must be known before a trap or any other condensate-handling device can be chosen. The accompanying chart permits easy and rapid calculation of the amount of condensate formed.

To use this chart you must know the pressure of the steam supply, the temperature rise of the material heated, the weight of the material heated, and the specific heat of the material. These factors are applied in a typical problem:

Example: How much condensate is formed in a canning retort when 2000 lb of fruit is heated from 60 F to 200 F by 25-psig steam if the specific heat of the fruit is 1.0? It takes 15 minutes to produce the temperature rise.

Solution: From the Table I, the value of X equalling (temperature rise of the material heated ÷

(Continued on page 217)

Nomograms in the Complete Series

In subsequent issues of Plant Engineering, the chart in this issue will be supplemented by nomograms dealing with the following:

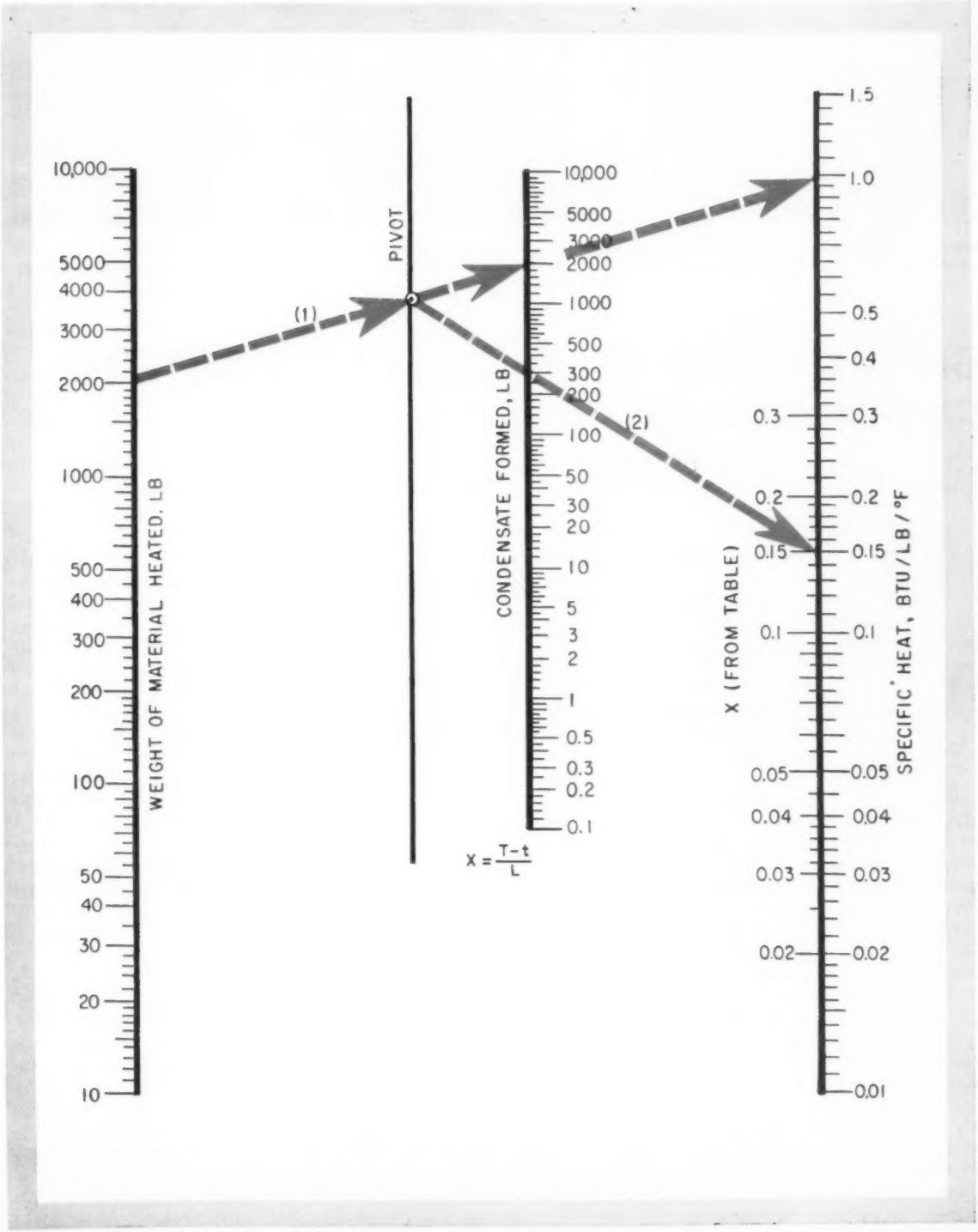
2. Condensate formed in submerged heating surfaces.
3. Condensate formed with excess heat-exchange area.
4. Condensate formed in air heating coils.
5. Condensate formed in coil-type space heaters.
6. Application of trap safety factors.

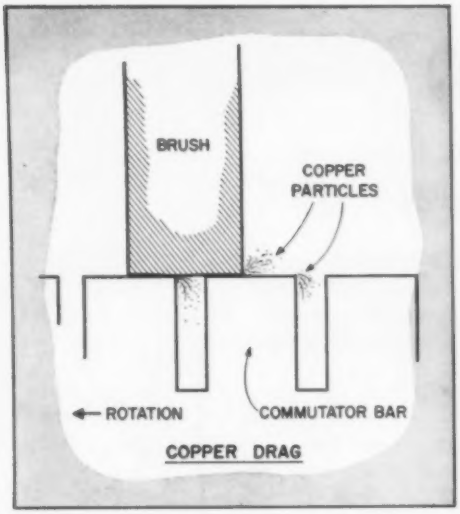
Table I. "X" at various pressures and temperature rises.

Pressure, psig	Temperature rise, F								
	40	60	80	100	120	140	160	180	200
5	0.042	0.062	0.083	0.104	0.125	0.146	0.167	0.187	0.208
10	.042	.063	.084	.105	.126	.147	.168	.189	.211
15	.042	.064	.085	.106	.127	.148	.169	.191	.212
20	.043	.064	.085	.106	.128	.149	.170	.192	.213
25	.043	.064	.086	.107	.129	.150	.172	.193	.214
30	.043	.065	.086	.108	.129	.151	.172	.194	.215
35	.043	.065	.087	.108	.130	.152	.173	.195	.216
40	.044	.065	.087	.109	.130	.152	.174	.196	.218
50	.044	.066	.087	.110	.132	.154	.176	.198	.219
60	.044	.066	.088	.111	.133	.155	.177	.199	.221
75	.045	.067	.089	.112	.134	.156	.179	.201	.224
100	.045	.068	.091	.114	.136	.159	.182	.204	.227
125	.046	.069	.092	.115	.138	.162	.184	.207	.230
150	.047	.070	.093	.117	.140	.163	.187	.210	.234
175	.047	.071	.095	.118	.142	.165	.189	.213	.236
200	.048	.072	.096	.120	.144	.167	.191	.215	.239

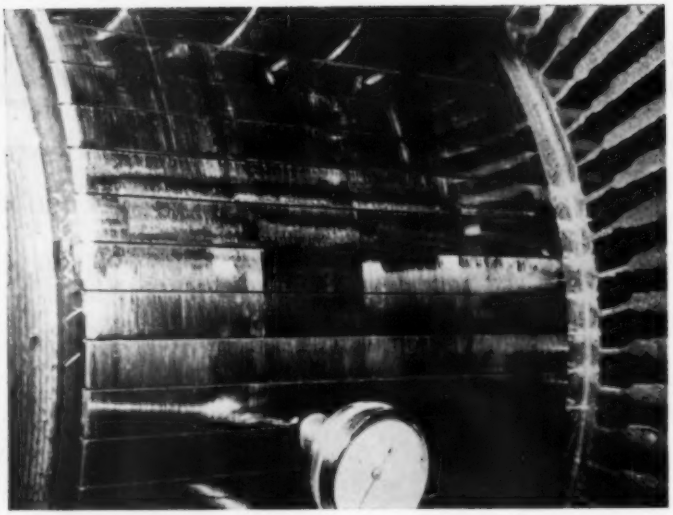
STEAM TRAP SELECTION

I. Determining Amount of Condensate Formed in Heating of Liquids and Solids





Copper chips from one segment being dragged across the mica toward the next copper segment.



Pitch marking caused by bad bearing. Sparking and burning on certain segments may indicate high or low commutator bars or imperfect soldering.

BRUSHES AND COMMUTATORS FIGHTING?

Calm Them Down With These Twelve Tips

By RICHARD S. TENER, Design Engineer, General Electric Company, Schenectady, New York

IMPROPER brush-commutator relationships can manifest themselves in two ways. They are excessive brush wear and excessive commutator wear. However, you don't have to wait for the commutator to wear down to realize that you are heading for trouble. Here are a few items that are seldom considered when checking excessive brush or commutator wear.

It is of the utmost importance that electrographitic or metal graphite brushes be operated at current densities near their publicized values on machines above 10 hp. Untreated electrographitic brushes should operate at a minimum of 40 amperes per square inch of surface in contact with the commutator. Metal graphite brushes should operate at 60 amperes per square inch or higher. Resin-bonded graphite brushes operate successfully from 20 to 50 amperes per square inch.

Relative humidity should be ideally about 40 per cent at 70 F. If the water content of the air is too low, there will be a tendency for brushes to dust away. If the water content is too high, the moisture will provide a ready vehicle to carry contaminating materials to the commutator surface. The film will be disturbed and brush and commutator wear will result.

There are a great many contaminants which cause deterioration of the commutator film and subsequent excessive brush and commutator wear. These include ammonia fumes, formaldehyde, tobacco smoke, sulfur fumes, paint fumes, sulfite fumes, chlorine gas, and carbon tetrachloride.

Faulty machine operation can be caused by eccentric commutator, high or low commutator bars, incorrect brush pressure, and side mica. This mica remains at the surface of the commutator between segments. It should have been removed when the commutator was undercut, but remained when the undercutting tool was not properly lined up with the mica segment.

Other machine faults are incorrect brush position, incorrect brush grade, interpole strength too weak or too strong, poor armature connection to commutation, loose brushes and improper brush angle.

We can now ask what steps the maintenance engineer can take to improve the operation of his machines. First of all, if his machines do not spark, the brushes ride smoothly on the commutator, and the commutator is a uniform brown in color with no burned bars, a healthy condition is indicated. He should let well enough alone.

Any indication of trouble should be investigated promptly to prevent undue wear of the commutator. A non-uniform film on the commutator with some threading and grooving may be caused by incorrect brush pressure, contaminated atmosphere or too low average brush density.

Check the brush pressure with a small spring scale. Most brush holders have some adjustment for tension. Be sure the brushes do not stick in the holders. Check the brush current density in amperes per square inch by taking two times the armature current and dividing it by the total number of brushes times the area of each brush in square inches.

The brush density can be raised

to the values recommended above by removing one or more brushes from each stud. Keep the brushes staggered properly and be sure to have one positive and one negative brush on the same commutator track. Keep the same number of brushes on each stud. Be sure the brush box is $\frac{3}{32}$ of an inch from the commutator.

Every effort should be made to keep contaminants out of the air that comes in contact with the commutator. Painting and cleaning areas should be kept away from the motors. If ammonia compressors are involved, be sure there are no leaks present.

The problem is more serious where chemical processes are involved. Motors known to be going into paper mills, sulfite or chlorine, are equipped initially with graphite brushes. Even so, efforts should be made to keep the air as clean as possible by separately ventilating the machines with air taken from the outside.

Consideration should be given to the prevailing winds in determining from which side of the building the air intake should be located. Solid covers over the commutator are helpful in preventing particles from falling on the commutator.

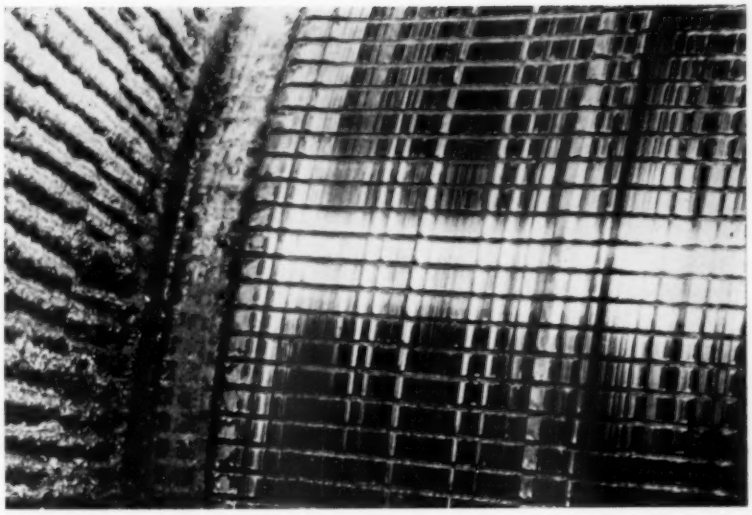
Check Humidity

Rapid brush wear may be caused by low humidity, particularly at high altitudes. If possible, bleed a little steam into the room. Vaporizers are also available and are often used to good advantage.

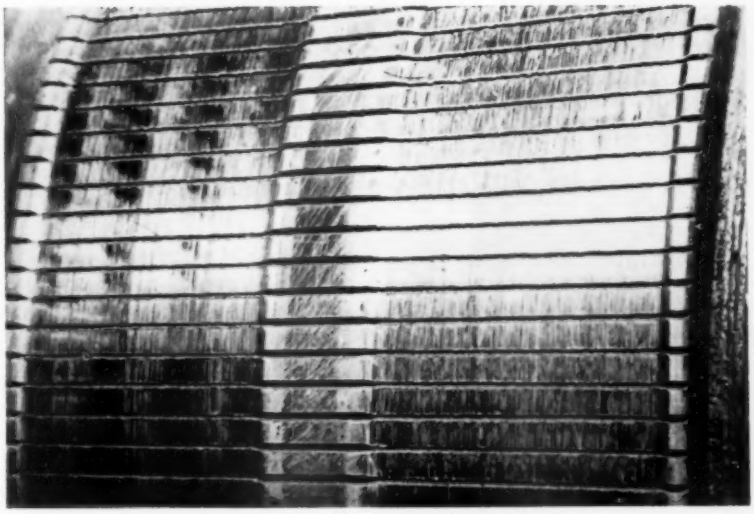
When sparking and burning occurs on certain commutator segments it may be an indication of high or low commutator bars or imperfect soldering of the armature conductor into the ear of the commutator. This may also be caused by side mica.

A high or low bar can be further confirmed by clicking of the brushes. If the bar is so high or low that it burns, it is probably necessary to remove the armature and turn the commutator in a lathe. If there is no low or high bar, the armature should be resoldered.

Before removing the armature, check very carefully for side mica. This will require a good source of light, a magnifying glass, and a scraping tool of some kind. A sharp knife is good but if it is ground to make a sharp-edged scraper, it is more effective.



Threading on commutator caused by improper brush application and exposure to contaminated atmosphere or by copper or mica flakes embedded in brush face



Grooving or wearing away of the commutator surface can be caused by incorrect brush pressure, abrasive brush action, atmosphere or too low brush current density

Sparking and burning of every other, every third, or every fourth commutator bar may be caused by incorrect commutating pole strength, brushes improperly located around the periphery of the commutator or an overloaded machine.

Be sure the maximum current is within the commutating limits of the machine. If this is the trouble, a re-arrangement of the starting resistors or timing relays may help. Otherwise refer to the manufacturer of the machine for recommendations on how to correct faults.

While the above may perhaps seem like home remedies, I have tried to outline some courses of action that the maintenance engineer can take which will help his brush-commutator team pull more effectively together. The best of these remedies, by far, is clean air. But if a chemical process is involved, and clean air very expensive, if not impossible to obtain, a variety of brushes are available both as to grade and manufacturer which go a long way toward a solution to difficult environmental troubles.

In general, a brush grade should not be changed except on the advice of the machine manufacturer. **End**

Fig. 1. Early stages of construction with lights, sprinklers, and air ducts in place.

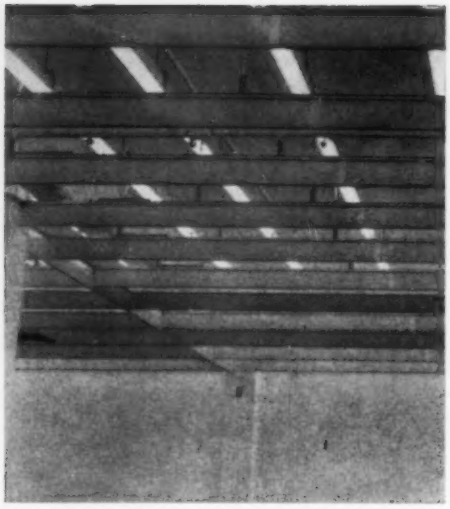


Fig. 2. Tracks, suspended from fixtures,

Luminous Ceilings Costly?
This Engineering Department Says "No"

By JOHN A. GILROY, Plant Engineer, Harnischfeger Corporation, Milwaukee, Wisconsin

INSTALLING a luminous ceiling in our engineering department and maintaining it for three years has proven, to our satisfaction, that costs can be quite comparable to conventional suspended acoustical tile construction. Our original costs, Table I, were $0.40 per sq ft higher for the luminous ceiling or $1480. for the 3700 sq ft area.

This small additional cost buys a lighting system with a high degree of comfort and has turned out to be a good investment. We are presently installing a luminous ceiling in another new building. Bids on competitive lighting systems showed that current costs are the same for the acoustical tile ceiling as for the luminous ceiling.

Structural design of the area allowed for a two-foot space above the finished ceiling height of ten feet. This space accommodates the air conditioning ducts, the sprinkler system, and the lighting system.

After the sprinkler system was installed, the underside of the metal roof deck and the sprinkler piping were sprayed with white enamel. This improves the reflectance of the space above the luminous ceiling.

Single-tube, open fluorescent strip fixtures were installed in continuous rows on 30-in. centers. These fixtures are designed to operate with eight foot, cool white, high output, rapid start, fluorescent lamps, operating at 800 ma. The air conditioning ducts were then installed, wrapped with a one-inch layer of glass wool insulation and covered with aluminum foil. Figure 1 shows the engineering area at this stage of the construction.

The plastic ceiling rests on tracks hung across the room on 36-in. centers. These tracks run at right angles to the rows of light fixtures. A metal track is fastened to the wall, around the perimeter of the room, to finish off the ceiling. The plastic is placed into an open section of the frame and then pulled into the closed track.

Weighing about ½ oz per sq ft, the plastic is 0.007-in. thick and does not support combustion. In the event of fire, heat at 140 F causes the plastic to lose its rigidity and the panels drop from the track, exposing the sprinkler heads.

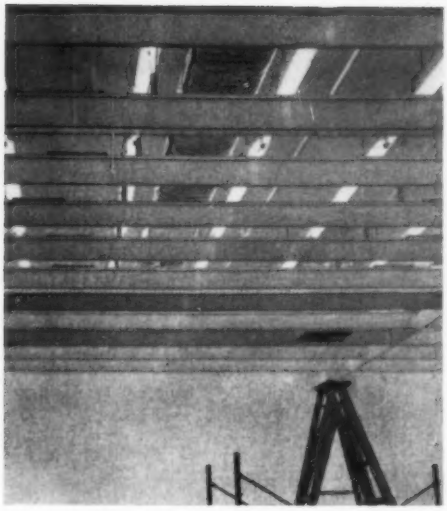
Acoustical correction is required with a luminous ceiling. The relatively hard surface of the plastic reflects sound waves and tends to raise the noise level unless corrective equipment is installed. This is readily accomplished by the installation of baffles hanging from the underside of the tracks.

Baffles are constructed of perforated steel and contain a sound absorbing pad. Figure 2 shows the construction completed except for the installation of the corrugated plastic material and Fig. 3 shows the finished ceiling.

Maintaining the designed intensity of 120 ft-c requires attention to the problem of replacing burned-out lamps and keeping the plastic clean. Electricians make a routine inspection of the area, every other week, to detect burned-out lamps. Close examination of the ceiling will show a dark spot below a tube requiring replacement.

Burned-out lamps are replaced in the morning before the office force starts working. One electrician rolls up the plastic while a second man replaces the tube and pulls the ceiling back into position. Two men change a lamp in about five minutes.

Depreciation studies of the effects



support both plastic and sound baffles

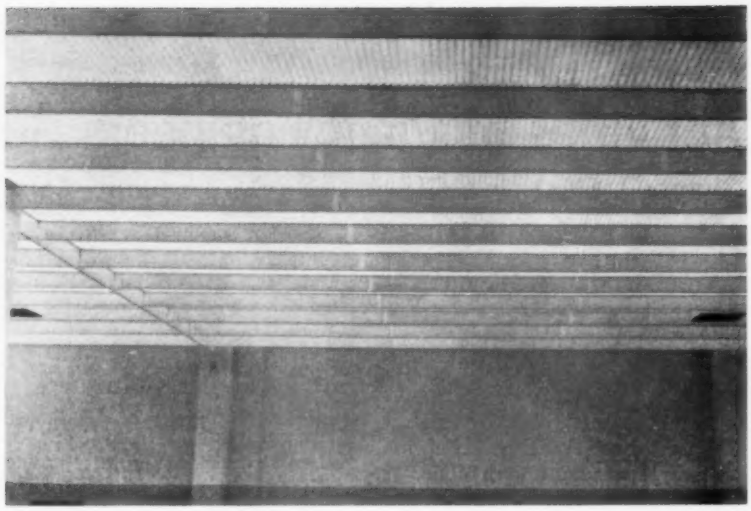


Fig. 3. Plastic is installed on tracks to complete the luminous ceiling lighting

of dirt on the plastic have indicated that the plastic should be cleaned at two year intervals. This is a simple procedure that is carried on at night with a gang of four men.

Two men work on ladders to roll up and take down the plastic. One man operates a washing machine and the fourth man carries the rolls of plastic between the two operations. The cost of removing, washing, and installing the plastic ceiling averages $0.02 per sq ft.

Purchased for $450, the washing machine consists of three separate tanks. The plastic is run through the first tank containing a detergent in water at 100 F. Here the plastic is scrubbed by a set of rotating brushes, then passes into a second tank where it is rinsed in cold water.

After the rinse, it passes into a third tank containing a wax solution. This destaticizes the plastic to keep it dust-free for a longer period. The plastic is allowed to drain and then rehung to dry. The sound control baffles may be wiped off with a detergent in warm water without removing them from the ceiling. The plastic can be returned to the manufacturer for washing at a cost of $0.03 per sq ft.

Many installations use the space above the luminous ceiling as a plenum chamber for the distribution of cooled air into the area. Our experience indicates that a 25 per cent reduction in air conditioning load can be effected by using ducts above the ceiling and bringing the openings in the duct system below the luminous ceiling. This by-passes most of the heat generated by the lighting system.

The plastic ceiling keeps the heat above the ceiling from coming down into the room. The return air supply and outside air are all in balance and the heat above the ceiling is not pulled down into the room. Extending the duct system above the ceiling and down through the luminous plastic cost an extra $1000 but the reduction in size of the air conditioning units and reduced operating costs will pay off this difference in a reasonable period.

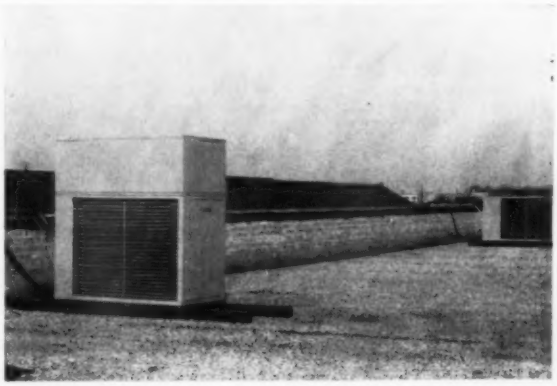
Air-cooled compressors and condensers are used in the air conditioning units. These are located on the roof of the area as shown in Fig. 4. Water-cooled machines are cheaper than air-cooled units but require the payment of a tax in addition to the cost of water used. The air-cooled machines are less expensive to maintain because there are no water lines to leak or scale.

These differences will pay for the slightly higher cost of air-cooled machines in a two-year period. **End**

Table I. Cost of luminous and conventional lighting systems

Luminous Ceiling		
Material	@ $1.75/sq ft	$6,475.00
Installation and Wiring	@ 1.25/sq ft	4,625.00
Air Conditioning and Duct Work	@ 1.75/sq ft	6,475.00
Total Cost		$17,575.00
Cost/sq ft		$4.75
Acoustical Tile Ceiling		
Ceiling Material and Installation	@ $0.55/sq ft	$2,035.00
Fixtures and Wiring Materials	@ 1.45/sq ft	5,365.00
Electrical Installation	@ 0.60/sq ft	2,220.00
Air Conditioning and Duct Work	@ 1.75/sq ft	6,475.00
Total Cost		$16,095.00
Cost/sq ft		$4.35

Fig. 4. Air-cooled air conditioning units are mounted on roof



Activities of Plant Engineers Societies

Chapters Elect New Officers—Prepare Exhibit—Tour Plant

FOLLOWING IS A brief report of what some of the Plant Engineers Societies are doing:

Wilmington

Members of the Wilmington Chapter of the AIPE heard an interesting presentation at one of their recent meetings by George O. Pitts. Mr. Pitts is a maintenance consultant with E. I. du Pont de Nemours & Co., Inc., and he presented a talk on the subject: Mechanic Development and Progression.

Milwaukee

New officers for the Milwaukee Chapter of the AIPE are:

R. B. Hofmann, of Pittsburgh Plate Glass Co., Paint Div., is the new president; C. T. Nelson, of Square D Co., vice president; R. Weggel, of Universal Rundle Corp., secretary; and J. G. Blanton, of E. R. Wagner Mfg. Co., treasurer. E. N. Potter, of International Harvester Co., will serve as Board Member for the coming year.

Gulf Coast

New officers of the Gulf Coast Chapter (Houston) are:

D. N. Dale, of Uvalde Rock Asphalt Co., president; J. P. Benson, Wyatt Metal & Boiler Works, vice president; and E. W. McPherson, Cleco Div., Reed Roller Bit Co., secretary-treasurer.

Northwestern Ohio

An interesting experiment was conducted by the Northwestern Ohio (Toledo) Chapter during Engineers' Week the early part of this year.

Sixteen of the 32 societies affiliated with the Toledo Technical Council prepared exhibits which were displayed in show windows in downtown Toledo.

The theme for the Northwestern Ohio Chapter's window display was "Plant Engineers in Industry—Areas of Responsibility." A scale model showing the buildings and grounds of a proposed Libbey-Owens-Ford Glass Fibers plant, which had been built by H. A. Jost, plant engineer, was used as the central feature of the display.

A lettered sign in the foreground read as follows: "This display is intended to show all major areas of responsibility of the plant engineer in industry."

Several wires were strung across the window and smaller cards were hung, each lettered with a plant engineering function, and with ribbon extending from each card to an appropriate location on the model. Typical cards included: Plant Buildings — new work and alterations; Plant Equipment—layout, installation, maintenance; Supervision of Outside Contractors; Plant Grounds; Fire Protection; Safety; Janitorial Services; Spare Parts Control; Cost Measurement — prepare expenditure requests; Maintenance Labor Negotiations; Materials Handling—layout and equipment; Security; Highway Trucks; Study of Material and Product Flow.

Kentuckiana

New officers recently elected for the Kentuckiana Plant Engineers Society are:

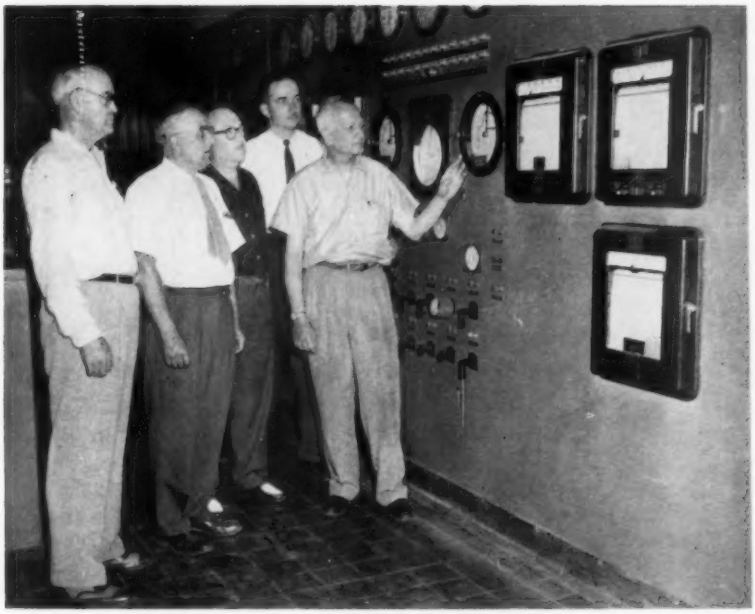
R. A. Andersen, of General Electric Co., is the new president; B. E. Head, Jr., of P. Lorillard Co., vice president; and T. L. Mussler, of W. E. Caldwell Co., secretary-treasurer.

Northern Illinois

Members and guests of the Northern Illinois Chapter of the AIPE recently toured the facilities of Public Service Company's Waukegan power plant.

Conducting the tour and answering questions were Joseph M. Schrank, station superintendent; John Percy, station engineer; Lester Haskell, power engineer; and Sidney Robinson, industrial relations director. Later John F. Bracken, an official from Com-

New officers recently elected for the Kentuckiana Chapter of the AIPE are, left to right: B. E. Head, Jr., vice president; C. R. Libby, retiring president; R. A. Andersen, new chapter president; and T. L. Mussler, secretary-treasurer.



Some of members of the Northern Illinois Chapter who recently toured Public Service Company's Waukegan power plant are, left to right: S. A. Simonson, president of the AIPE; C. E. Fathauer and R. J. Gordon, chapter board members; R. J. Podboy, vice president; and L. C. Haskell, secretary-treasurer.

monwealth Edison Co., parent company, reported on problems and progress of the rapidly expanding system.

After the tour, the group dined at the Waukegan Moose Club, where a brief business meeting was held following dinner. The group voted to retain its present officers until next spring rather than elect in December, as had been the custom. This move brings the chapter's activities in line with the national organization.

The present officers are: B. Hutchins, of Great Lakes Naval Training Center, president; R. Podboy, of American Steel & Wire Co., vice president; and L. C. Haskell of Public Services Company, secretary-treasurer.

Valley Forge

New officers for the Valley Forge Chapter of the AIPE are:

C. H. Johnston, of Lansdale Tube Co., is the new president; H. G. Blagrove, Leeds & Northrup Co., vice president; L. J. Wisely, Burroughs Corporation, secretary-treasurer; and W. J. Knapp, Adam Scheidt Brewing Co., Board Member.

Boston

New officers of the Boston Chapter of the AIPE are:

G. N. Fisher, of Monsanto Chemical Co., is the new president; L. C. Schoenherr, of New England Confectionery Co., vice president; L. J. Monty, of Artisan Metal Products, Inc., treasurer; and R. E. Gladstone, of Converse Rubber Co., secretary.

Pittsburgh

New officers for the Pittsburgh Chapter of the AIPE are:

T. L. Bieber, of Union Switch & Signal Division, Westinghouse Air Brake Co., is the new president; W. C. Kerr, of Liberty Mirror Division, Libbey-Owens-Ford Glass Co., vice president; and E. L. Guy, of Mine Safety Appliance Co., secretary-treasurer.

Orange County

New officers for the newly organized Orange County Chapter (California) are:

L. J. Hayney, of SPS Western, Div. of Standard Pressed Steel Co., is the new president; T. Woodworth, Disneyland, vice president; M. D. Levinson, Ador Corporation, secretary; and V. Bauer, Anaconda Wire and Cable Co., treasurer.

Members of the Wilmington Chapter heard an interesting talk by G. O. Pitts, maintenance consultant with Du Pont.

Gulf Coast Chapter's new officers are, l to r: D. Dale, president; J. Benson, vice president; E. McPherson, secy-treas.

Annealing Furnaces Move to the Work—Preloading Saves Time

FIVE NEW SPHEROIDIZING bell-type furnaces, each capable of producing 1650-degree heat, are being installed for the annealing of wire at the American Steel and Wire Waukegan, Ill., Works.

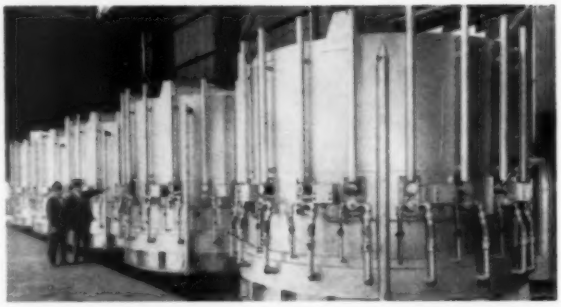
The five new units, according to a company spokesman, will increase spheroidizing capacity by 75 per cent.

Spheroidizing, or annealing, is the heat treatment used to prepare hard drawn steel wire or rods for further reduction and shaping into a satisfactory end product for eventual consumer use.

The new units are 108 in. high and measure 114 in. across the base. They are fired by natural gas and have a heat range of 750 to 1650 F.

In the center of each furnace base is a specially installed propeller-like blade, revolving 1750 times a minute to evenly circulate gases within the furnace. A mixture of 85 per cent nitrogen and 15 per cent hydrogen is used within the furnaces after all oxygen has been removed.

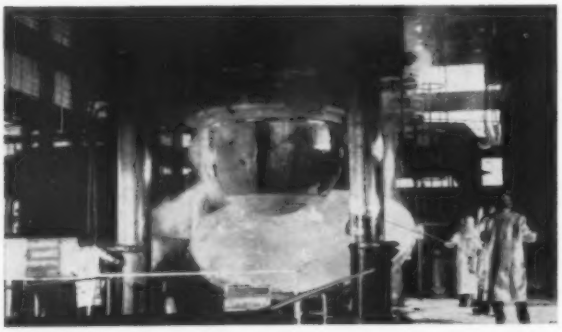
Ten bases were constructed for use with the five



furnaces. Doubling the number of bases will mean more efficient utilization of heat and will cut the time needed for each cycle. The normal procedure would appear to be the moving of the wire to the furnaces, but instead, the furnaces make the move. An overhead crane lifts each furnace, still hot, into the air and moves it down and over an adjacent base already loaded.

Single-Stroke Die Forming Reaches New "High" in Reactor Vessel Forming

BELIEVED TO BE the largest, thickest and heaviest ever made at a single stroke by die-forming, a pressure vessel closure was recently completed at the Babcock & Wilcox Company's Barberton, Ohio, works. The closure will become the bottom head of a nuclear reactor vessel.



The head was pressed from a 58,646-lb, flat circular plate of 70,000 psi tensile strength, carbon-silicon steel, 15 ft in diameter and $7\frac{13}{16}$ in. thick. Before forming, the plate surface which was to become the inside of the head was clad with a 0.109-in.-thick layer of type 304 stainless steel.

To make the plate workable, it was heated approximately six hours to bring its temperature to 2000 F. It was then positioned between a 70-ton male die and a female die ring, on a 6500-ton vertical hydraulic press. A force of some 3300 tons was exerted to form the plate into a hemisphere-shaped head with an outside diameter of 11 ft, $\frac{5}{8}$ in. and an inside diameter of nine feet, nine inches.

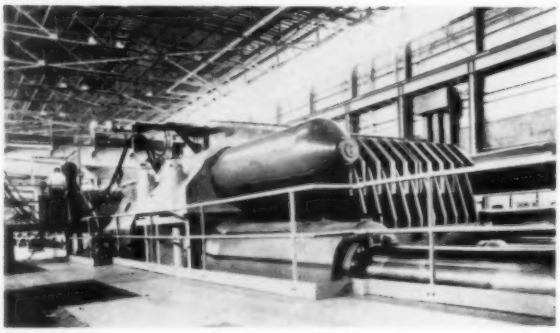
Further steps in the fabrication process involve heat treating, testing, drilling holes for water inlet and control rod nozzles, welding the nozzles to the head and welding the head to the shell of the reactor. All welds were radiographically inspected.

Aluminum Plate Gets Stretched, Straightened and Strengthened in Big "Puller"

A STRETCHER for aluminum plate—the widest such unit in existence—is in operation at Aluminum Company of America's Davenport, Iowa, plant. The giant machine, designed and built by Loewy-Hydropress Div., Baldwin-Lima-Hamilton Corp., is over 160 ft long and weighs more than 5,500,000 lb.

Rolled aluminum plate, up to six inches thick and 152 in. wide, can be stretched and straightened at a speed of 24 in. per minute, with a pull of 16 million lb. The lengths of heavy plate are then cut and milled to make various structural components, such as integrally stiffened skin sections for aircraft.

This outsize metal processing tool is pushbutton operated by one man from a control desk. Stretch-straightening can be achieved by either setting the pressure to a predetermined stress in the plate or by stretching the plate to a predetermined length by adjusting the stroke limit.



How does your wire and cable supplier stack up?

As a user of electric power, you've much to gain by learning what your wire and cable supplier does to assure his being able to fill your needs.

Here are five key areas you'll want to explore when selecting a supplier. As you glance through them, notice how well Rome Cable "stacks up" as the kind of supplier we think you'd like to have serving you:

1. Quality products. Only when your supplier consistently provides the *best* can you have real confidence in him. The quickest way to a customer's trust, we've found, is through an inspection routine almost unbelievably rigid, where the Inspection Department is completely independent of both Production and Sales. This procedure results in products you can depend on.

2. Broad selection. Your supplier's *versatility* often determines how ably he can serve you. You can look to Rome Cable for a balanced line of standard wires and cables as well as highly specialized types of cable—in either copper or aluminum—plus a growing selection of conduit, cable troughs, and related equipment.

3. Rapid supply. How fast can you get the wire or cable you want? Are you sometimes forced into postponing wiring plans or accepting substitutes? No matter where your plants are, you can get prompt service from one of 450 Rome distributors, located coast to coast. These men carry a wide variety of different types and sizes of Rome wire and cable *in stock*—ready to go to work for you *today*.

4. Personalized service. How accessible are your supplier's salesmen when you really need them? Your Rome sales engineer is ready to work with you and your men at any time. Whether you need technical advice, emergency shipments, price information, or special help of any kind, a Rome representative will immediately go to work for you.

5. Research. Are you getting the advantage of *new improvements* in the wire and cable you buy? To do so, you need a research-minded supplier like Rome—with a research program that has developed an impressive string of industry "firsts," and the production know-how to bring better wires and cables to you as soon as they are proved.

Specify Rome wires and cables for your next job. Contact your nearest Rome Cable representative for more information—or write to Department 156, Rome Cable Corporation, Rome, New York.

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Annealing Furnaces Move to the Work—Preloading Saves Time

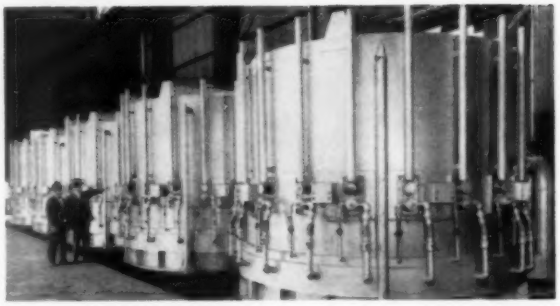
FIVE NEW SPHEROIDIZING bell-type furnaces, each capable of producing 1650-degree heat, are being installed for the annealing of wire at the American Steel and Wire Waukegan, Ill., Works.

The five new units, according to a company spokesman, will increase spheroidizing capacity by 75 per cent.

Spheroidizing, or annealing, is the heat treatment used to prepare hard drawn steel wire or rods for further reduction and shaping into a satisfactory end product for eventual consumer use.

The new units are 108 in. high and measure 114 in. across the base. They are fired by natural gas and have a heat range of 750 to 1650 F.

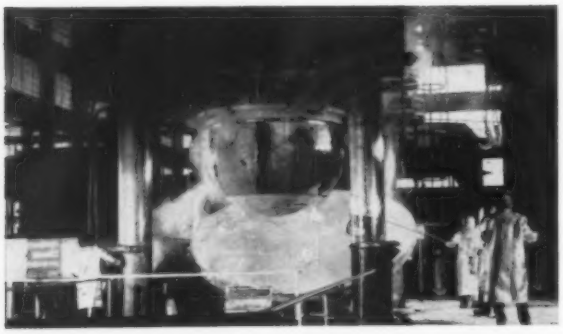
In the center of each furnace base is a specially installed propeller-like blade, revolving 1750 times a minute to evenly circulate gases within the furnace. A mixture of 85 per cent nitrogen and 15 per cent hydrogen is used within the furnaces after all oxygen has been removed.



Ten bases were constructed for use with the five furnaces. Doubling the number of bases will mean more efficient utilization of heat and will cut the time needed for each cycle. The normal procedure would appear to be the moving of the wire to the furnaces, but instead, the furnaces make the move. An overhead crane lifts each furnace, still hot, into the air and moves it down and over an adjacent base already loaded.

Single-Stroke Die Forming Reaches New "High" in Reactor Vessel Forming

BELIEVED TO BE the largest, thickest and heaviest ever made at a single stroke by die-forming, a pressure vessel closure was recently completed at the Babcock & Wilcox Company's Barberton, Ohio, works. The closure will become the bottom head of a nuclear reactor vessel.



The head was pressed from a 58,646-lb, flat circular plate of 70,000 psi tensile strength, carbon-silicon steel, 15 ft in diameter and $7\frac{13}{16}$ in. thick. Before forming, the plate surface which was to become the inside of the head was clad with a 0.109-in.-thick layer of type 304 stainless steel.

To make the plate workable, it was heated approximately six hours to bring its temperature to 2000 F. It was then positioned between a 70-ton male die and a female die ring, on a 6500-ton vertical hydraulic press. A force of some 3300 tons was exerted to form the plate into a hemisphere-shaped head with an outside diameter of 11 ft, $5\frac{5}{8}$ in. and an inside diameter of nine feet, nine inches.

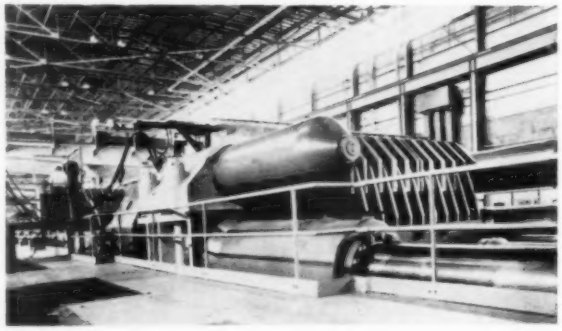
Further steps in the fabrication process involve heat treating, testing, drilling holes for water inlet and control rod nozzles, welding the nozzles to the head and welding the head to the shell of the reactor. All welds were radiographically inspected.

Aluminum Plate Gets Stretched, Straightened and Strengthened in Big "Puller"

A STRETCHER for aluminum plate—the widest such unit in existence—is in operation at Aluminum Company of America's Davenport, Iowa, plant. The giant machine, designed and built by Loewy-Hydropress Div., Baldwin-Lima-Hamilton Corp., is over 160 ft long and weighs more than 5,500,000 lb.

Rolled aluminum plate, up to six inches thick and 152 in. wide, can be stretched and straightened at a speed of 24 in. per minute, with a pull of 16 million lb. The lengths of heavy plate are then cut and milled to make various structural components, such as integrally stiffened skin sections for aircraft.

This outsize metal processing tool is pushbutton operated by one man from a control desk. Stretch-straightening can be achieved by either setting the pressure to a predetermined stress in the plate or by stretching the plate to a predetermined length by adjusting the stroke limit.



How does your wire and cable supplier stack up?

As a user of electric power, you've much to gain by learning what your wire and cable supplier does to assure his being able to fill your needs.

Here are five key areas you'll want to explore when selecting a supplier. As you glance through them, notice how well Rome Cable "stacks up" as the kind of supplier we think you'd like to have serving you:

1. Quality products. Only when your supplier consistently provides the *best* can you have real confidence in him. The quickest way to a customer's trust, we've found, is through an inspection routine almost unbelievably rigid, where the Inspection Department is completely independent of both Production and Sales. This procedure results in products you can depend on.

2. Broad selection. Your supplier's *versatility* often determines how ably he can serve you. You can look to Rome Cable for a balanced line of standard wires and cables as well as highly specialized types of cable—in either copper or aluminum—plus a growing selection of conduit, cable troughs, and related equipment.

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33,000-Volt Substation Installed Indoors—A Notable "First"

FIRST OF ITS SIZE ever installed indoors in the Philadelphia Electric Company service area and possibly the first in the country—a 33,000-volt electrical substation is now in operation at the Collegeville, Pa., plant of Superior Tube Co.

The inside location permits future expansion of the physical plant in any direction without moving the substation to make room for new construction.

The addition now underway will provide 35,000 additional square feet of production space and a new air-conditioned office building.

The new electrical substation, which is located in the basement of Superior's large mill, doubles the plant's transformer capacity. Both it and Superior's first substation, located outdoors on the west side of the plant, have three 500 kva transformers. The new substation has a General Electric indoor A.C.B. draw-out switchgear to distribute power to various parts of the plant.

Installing the substation indoors required special safety measures. The wires from the 33,000-volt primary line were sheathed in lead and brought underground into the basement location. The most difficult problem was to provide ventilation to cool the transformers while making provisions to contain and put out transformer fires should they occur.

Superior's engineering department designed and built a special concrete block vault to house the three transformers. Cooling air flows into the vault through a screened opening in one wall, over the transformers and through a duct opening in the opposite wall and then to the roof. For fire protection, heavy metal slats, resembling a Venetian blind, are installed inside the opening through which the air enters. They are held open with a chain, one link of which is made from metal with a low melting point. If fire breaks out, the link melts, and the metal slats close to seal off the opening. With the air supply cut off the fire quickly dies out.

Computer Control for Steam Plant—Big Step Towards Automatic Generation

AT THE NEW 210,000-KILOWATT UNIT at Sterlington Steam Station of the Louisiana Power & Light Company, for the first time, a power plant control room will be devoid of most of the usual array of dials, gages and recorders. Replacing them is a row of cabinets in which thousands of transistors and other equipment perform millions of mathematical operations. This "solid state" construction provides an unprecedented degree of reliability and availability making possible continuous, round-the-clock operation.

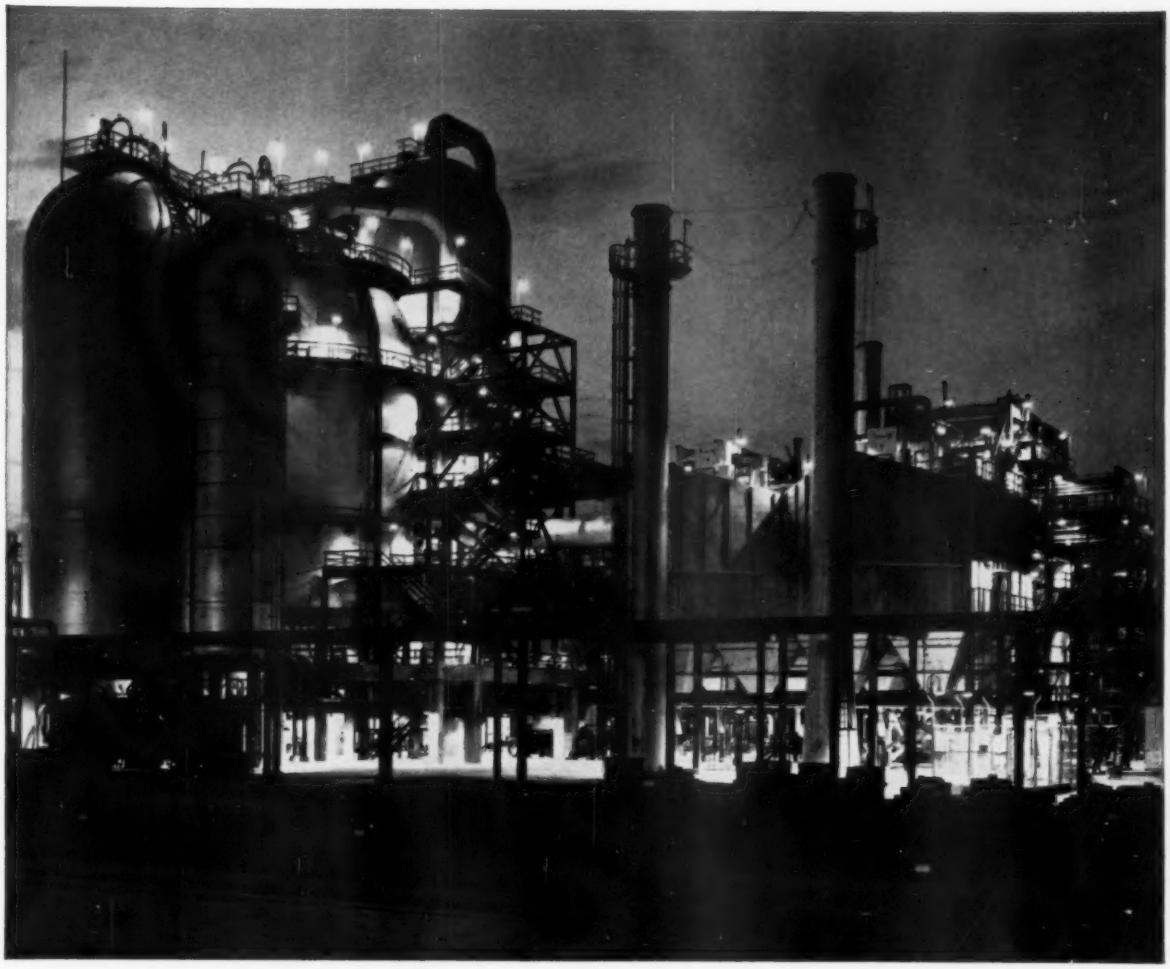
Developed and produced by the Daystrom Systems Division, La Jolla, Calif., the new Operational Information System installed at the plant handles 350 points; outputs are temperatures, flows, pressures, heat rates, and various electrical measurements.

According to Louisiana Power & Light engineers, the Daystrom installation will automatically measure 250 temperature points, such as bearing and oil temperatures, boiler temperatures, steam temperatures, transformer temperatures and other temperatures important to plant operation. Should any of these temperatures register higher or lower than a preset point, an alarm will sound, and the reading will be printed out on a separate unit indicating its location in the plant. It will also print at regular time intervals 100 plant readings necessary for accounting and trouble-shooting records. At any time the operator desires, the unit will produce a written record of any of the measurements in the system.

The heart of this new installation is the transistorized computer, utilizing a memory unit presently capable of storing 2048 different pieces of information with provisions for increasing this storage to 16,384 pieces, and which is programmed to provide complete operating data for the safe operation of the plant.

Engineers at Louisiana Power & Light stated that the equipment was installed primarily to provide operating experience with the type of equipment that will eventually be used in the completely automatic power plant.

This will be the continuous computer scanner, where automatic equipment, supervised and controlled by the computer, will take over startup, operation, and shutdown without any human supervision.



Because exceptional resistance to corrosion is needed...

57 miles of Rome Synthinol 901 building wire installed in just one major oil refinery

Under actual working conditions at a major oil refinery in Southern California, Rome's Synthinol 901 outperformed every other building wire tested. The other wires included regular TW, neoprene-covered, and braided rubber-insulated building wires. Lead-covered wire was also tried; and it was entirely satisfactory except for the excessive cost and handling problems.

Rome's Synthinol 901 was used extensively for the low-voltage wiring in this refinery because of its proven resistance to moisture, oil, and corrosive vapors – environmental hazards common to refinery operations. These low-voltage applications – 600 volts and under–include not only control circuits but also the general wiring of office and warehouse buildings and refinery equipment.

Plant and oil refinery engineers have also found that Synthinol 901's superior heat deformation resistance makes it particularly applicable in locations where greater than normal heat conditions exist. In fact, it's now being used in place of Type TA asbestos-covered wire in panel boards and switchboards where high temperatures are known to occur. Rome's Synthinol 901 has proven to be an entirely satisfactory and economical solution to the exacting demands of this type application. Try Rome's Synthinol 901–under your own operating conditions–and see for yourself how well it performs. You'll find it's ideal for low-voltage circuits in refineries, chemical plants, and similar installations where electrical wiring is exposed to corrosive atmospheres.

Specify Rome's Synthinol 901 for your next job. Contact your nearest Rome Cable representative for more information–or write to Dept. 321, Rome Cable Corporation, Rome, N. Y.

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NEW PLANT CONSTRUCTION —advance information on location, costs

Burbank, Calif. — General Controls Company's aircraft electronics division, 801 Allen Ave., Glendale, Calif., plans to construct a new facility here for the manufacture of company products. First unit of the multiple building plant will have a floor area of 70,000 sq ft with future plans for expansion up to 280,000 sq ft. Work on the new $2-million facility will begin at once for completion by late 1959.

Pittsburg, Calif. — Union Carbide Corp.'s Linde Co. Division plans to construct a new plant for the production of liquid oxygen and liquid nitrogen to meet the needs of the greatly expanding West Coast missiles industry. New unit will have a capacity of 300 tons per day. The first section, with a capacity of 115 million cu ft per month is scheduled to go into operation by June 1959; the entire plant, with a total capacity of 220 million cu ft per month will be on stream by early 1960.

Richmond, Calif.—Standard Oil Co. of California, 225 Bush St., San Francisco, Calif., has announced that its subsidiary Western Operations, Inc., plans an estimated $35-million expansion program at its refinery here. Company will build a new catalytic cracker unit with a capacity of 40,000 bbl per day, contract for which has been awarded to the Fluor Corp., 2500 S. Atlantic Blvd., Los Angeles, Calif. Other additions will include a large waste heat boiler installation, an alkylation unit and an isomerization unit. Construction of the new units will begin at once for scheduled completion by the summer of 1959.

Baldwin, Fla.—Westinghouse Electric Corp., Pittsburgh, Pa., plans to erect a new one-story, 18,000-sq ft plant for apparatus repair. Plant, with equipment, is expected to cost about $350,000.

Chicago, Ill.—Inland Steel Co., 38 S. Dearborn St., plans expansion of company's tin-plate capacity to meet increasing demand for tin cans. Project will make use of existing auxiliary equipment but will include installation of new coil-handling equipment in the hot and cold strip mills that will also be used for other products.

Granite City, Ill.—Granite City Steel Co., Hamilton & Randolph Streets, will increase rated annual steel making capacity of plant located here to 1,320,000 ingot tons. Increase reflects the partial completion of a $36.5-million expansion program currently under way and scheduled for completion by 1959. At that time the annual capacity of seven furnaces will be 1,584,000 tons.

Lemont, Ill. — Ceco Steel Products Corp., 5601 W. 26th St., Chicago, Ill., plans to erect a structural steel mill here, reported to cost about $11 million. Company will operate the mill through a new wholly owned subsidiary, Lemont Manufacturing Corp. The mill will be placed in partial operation by the fall of 1959 and at capacity by 1960. Engineer and contractor for the Lemont plant is the Rust Engineering Co., Pittsburgh, Pa.

Muncie, Ind.—Westinghouse Electric Corp., plans to construct a large power transformer plant on a 300-acre building site, just south of this city. No date has been set as yet for the start of construction but plant is expected to be in full production by late 1961 or early 1962. Estimated size of future transformers made it necessary to consider new facility which would have lifting facilities adequate for such weights.

Norco, La.—Shell Chemical Corp., 380 Madison Ave., New York, N. Y., has awarded a contract to the Lummus Company, 385 Madison Ave., New York, N. Y., for the construction of an acrolein unit at company's plant here. New unit, part of company's $10-million glycerine expansion program, is slated for completion late in 1959. It will help plant boost output to 35 million lb of glycerine annually.

Waltham, Mass.—Canada Dry Corp., 100 Park Ave., New York, N. Y., plans to construct a new plant here for the production of soft drinks and beverage syrups. Ground for the new facility has already been broken and construction will begin at once. Plant when completed in late 1959 will have a production capacity of more than five million cases of soft drinks, plus 500,000 gallons of beverage syrups annually.

Columbus, Miss. — Hef, Inc., jointly owned subsidiary of Foote Mineral Co., Philadelphia, Pa., and Hooker Electrochemical Corp., Niagara Falls, N. Y., plans to construct a new plant here for the production of ammonium perchlorate, a chemical used as an oxidizer in solid rocket propellants. Work will begin at once for scheduled completion late next year.

Kansas City, Mo. — Flour Mills of America, Inc., 20 W. 9th St., plans to expand company's elevator-capacity. Company proposes to add facilities for an additional 500,000 bushels to its Kansas City unit; two million bushels to the North Kansas City, Mo., plant, and about 1,500,000 bushels at its terminal elevator in Central Bluffs, Iowa. New construction is planned to begin at once.

Springfield, Mo.—Dayton Rubber Co., 10 Rubber St., Dayton, O., plans to construct a new one-story mechanical rubber goods plant on 62-acre site recently acquired. New facility will have a floor area of 175,000 sq ft and will be constructed of brick and concrete. Plant when completed in early 1959 will cost approximately $2.5 million.

Billings, Mont.—Carter Oil Co., subsidiary of Standard Oil Co. of N. J., Tulsa, Okla., plans to construct a large hydrofluoric acid alkylation unit with a capacity of 2300 gallons per day. New unit, being built under the supervision of the Refinery Engineering Co., Tulsa, Okla., will be completed by 1959.

Cranbury, N. J.—Carter Products Co., Inc., 53 Park Place, New York, N. Y., has begun construction of a large manufacturing plant for company's toiletry and proprietary products. New plant will include manufacturing, shipping and warehouse facilities for all of Carter products as well as those of its pharmaceutical division, Wallace Laboratories. Completion of the building, which will represent an investment of $3.5 million, is slated for mid-1959.

Linden, N. J.—Hatfield Wire & Cable Co., a division of Continental Copper & Steel Industries, Inc., 491 Hillside Ave., Hillside, N. J., plans to construct a new plant for the manufacture of rubber-covered wire and cable. Plant, with 300,000 sq ft of floor space, will be constructed on a 62-acre plot. Work will begin at once for completion by late 1959 or early 1960. Plant, exclusive of land, will cost an estimated $3.5 million.

Eastview, N. Y.—Union Carbide Corp., 30 E. 42nd St., New York, N. Y., plans to resume construction of its multimillion dollar research facility here. Company recently deferred construction pending further study of company needs and general economy. New unit will comprise a three-story building on a 280-acre site. Main structure will have a floor area of 85,000 sq ft and will house 53 laboratory units.

Cleveland, O.—General Electric Company's Lamp Division plans to resume construction of its research, engineering and administration center in suburban Richmond Heights, for company's lamp glass department. Partial completion of the one-story brick and concrete structure is now scheduled for early 1959. It will have a floor area of 150,000 sq ft. Company also has plans for the extension of four new lamp division operations for a total expenditure of $12.5 million.

Fort Worth, Texas—Alcon Laboratories, Inc., plans to construct a $1-million dollar laboratory and administration building on large building site here. Ground has been broken and construction will begin at once. New facility is scheduled to be in production by the spring of 1959.

NOW FARMERS GET LIQUID FERTILIZER

thanks to B.F.Goodrich Koroseal pipe

THE Washington Farmers' Co-operative Association in Seattle decided to launch something new—big-scale distribution of chemical liquid fertilizers. One of their toughest problems was to get the basic ingredients, such as green phosphoric acid and traces of nitric and hydrochloric acid, from storage to mixing tanks, without corroding the piping.

For a year the Farmers' Association experimented. Ordinary metal pipe couldn't take the internal corrosion and external weathering. Then the solution: B.F.Goodrich Rigid Koroseal polyvinyl chloride pipe!

Now, thanks to the remarkable corrosion resistance and unusually long-wearing qualities of Koroseal, the Association's liquid fertilizer stations are enjoying continuous trouble-free operation.

Rigid Koroseal pipe has solved countless problems for a wide variety of industrial applications. Easy to install, it can be threaded, cut, welded, drilled. It has excellent insulation properties, is unaffected by most alkalies and acids. It is completely inert in the presence of oil, alcohol and salt solutions. Koroseal will not support combustion and never needs to be painted.

For information on how B.F.Goodrich Koroseal can make your operations more efficient, fill in and mail the coupon below. *B.F.Goodrich Industrial Products Company, Marietta, Ohio.*

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B.F.Goodrich *Koroseal rigid vinyl products*

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How to get a "custom" pump at a standard price

Here's a new line of vertical centrifugal pumps easily tailored to your exact needs.

For process transfer or heavy-duty sump service, these pumps have features which assure long trouble free life with a minimum of maintenance.

Because they're built from standard parts, delivery is fast and there is no premium charge for custom building. When you want to change pit depth or pump ratings, you merely replace necessary parts. Units may be adapted in the field. Shafts and pipe columns are available for any pump length from 2 to 20 ft. in 6-inch increments.

There are types for wet or dry pits, with capacities to 1080 GPM or heads to 290 ft. Vaporproof construction is available.

Complete details in Bulletin 726.2.

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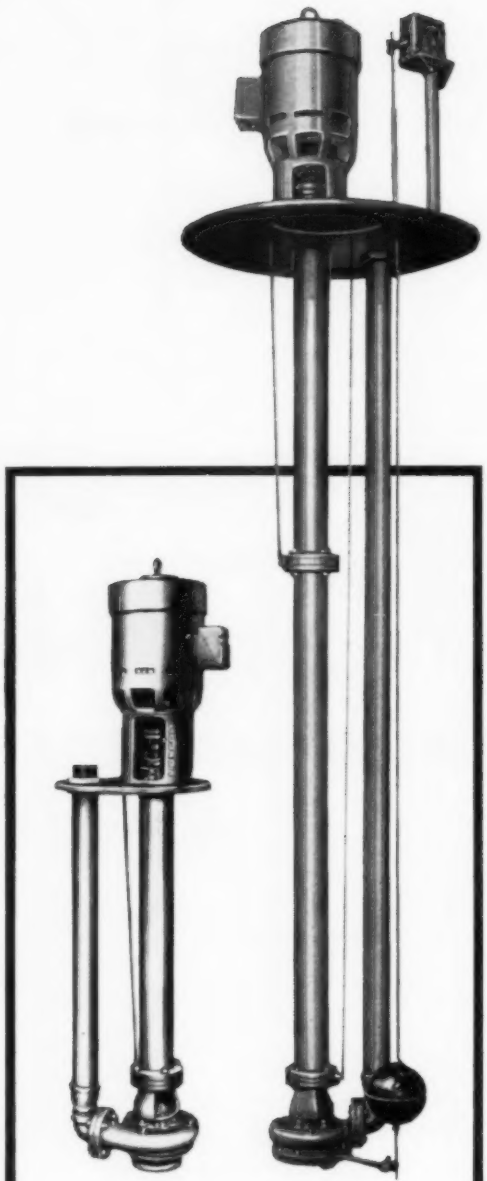

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GOULDS

PUMPS FOR INDUSTRY

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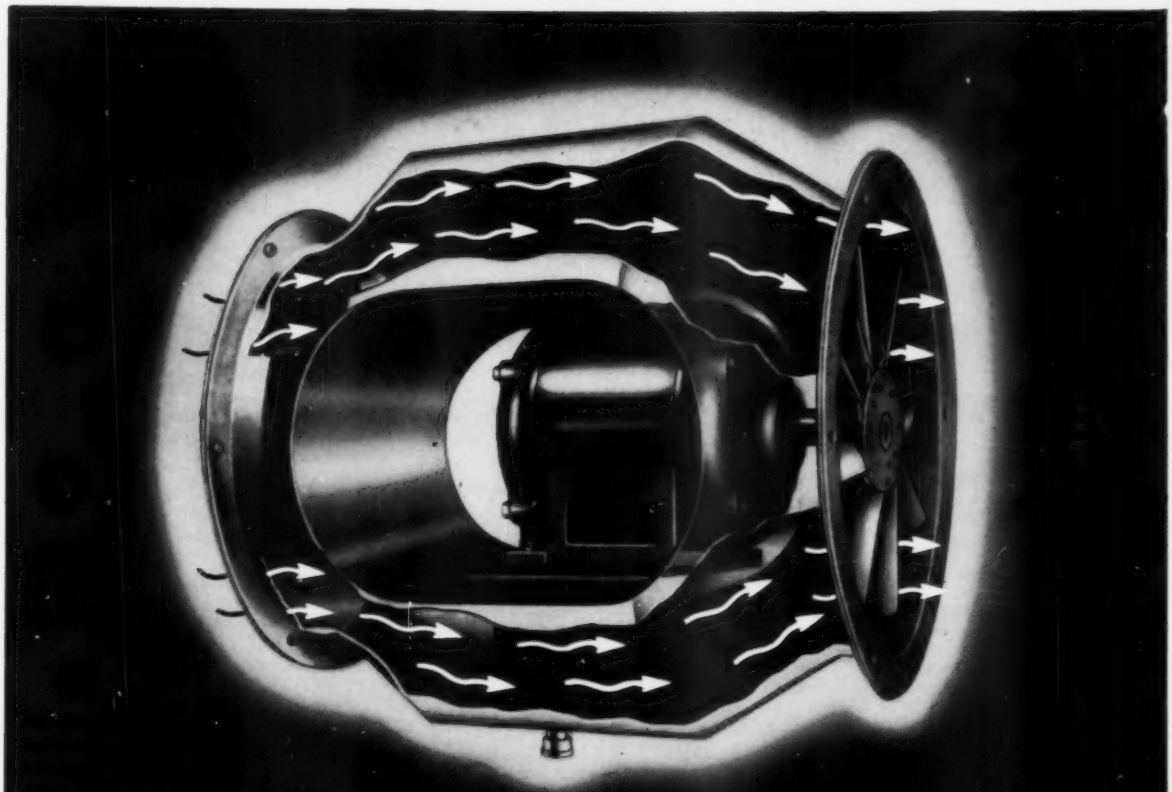

YOU PAY NOTHING for the very element that makes THE DIFFERENCE in Bifurcator® Fume Removal

The important, cost-free element is DeBothezat's 30 years experience in designing top efficiency into a bifurcated-housing fan and in applying this fan unit to fume removal problems.

You can confidently specify a DeBothezat Bifurcator . . . install it . . . and have trouble-free operation.

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☐ Send Bulletin DB-37-55 containing complete data on the Bifurcator for exhausting corrosive fumes.
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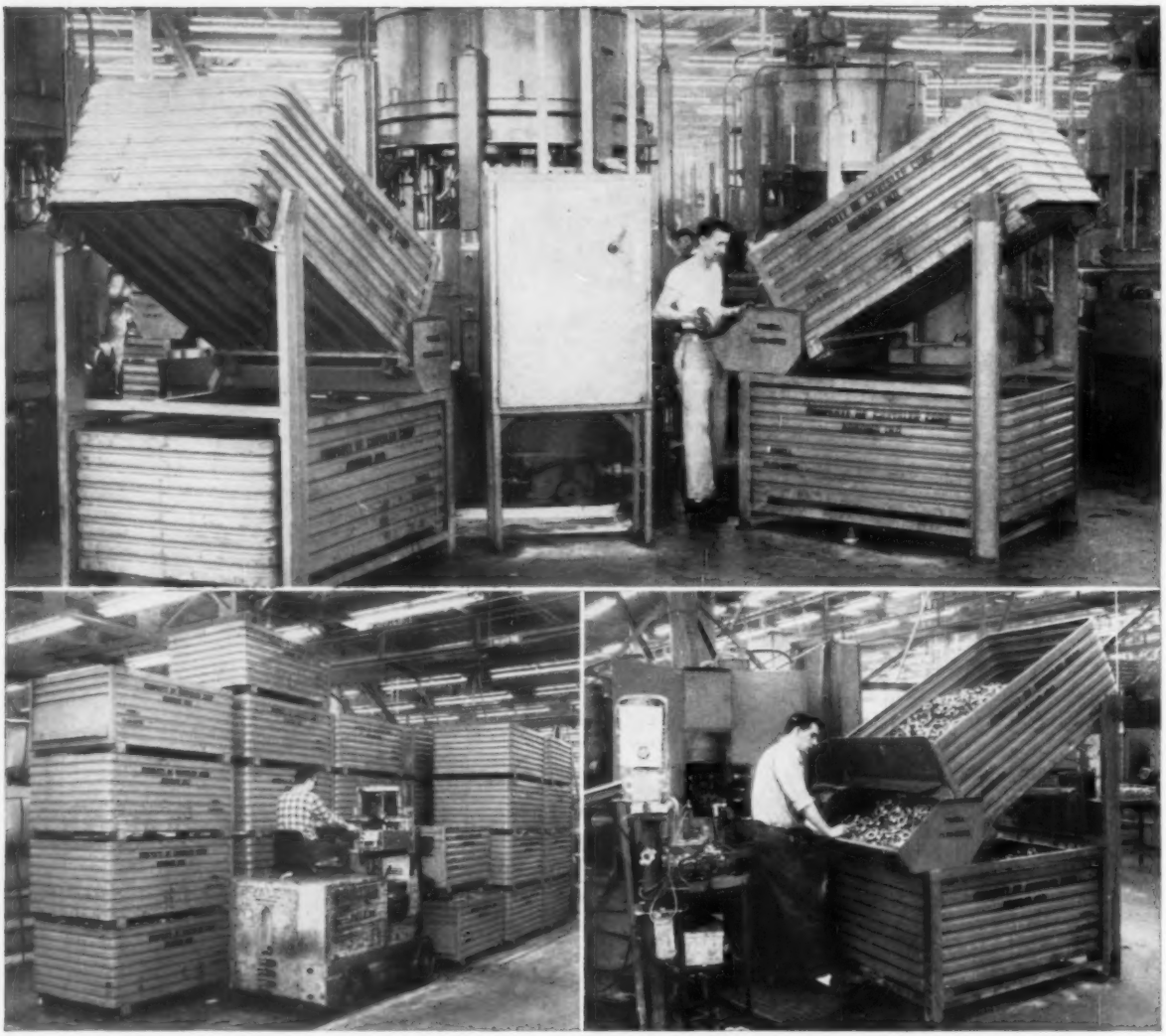

Photos through courtesy of Chrysler Corporation.

Preconceived Mass Handling is possible when a manufacturer designs and builds a plant from the ground up. That's what the Chrysler Corporation did at Kokomo, Indiana. The entire plant was constructed to meet the requirements of a specific operation in the most modern and efficient manner possible. They selected the **Powell Flowmatic*** materials handling system . . . by far the most economical and fastest operating mass handling equipment available today. Literature upon request.

*Patent: No. 2762529

POWELL PRESSED STEEL SINCE 1920

POWELL *flow-mation** SYSTEMS

The Powell Pressed Steel Co. *Hubbard, Ohio*

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Yes, you can save cable dollars when you go to higher voltages!

For 15 kv and up—consider Anaconda Durasheath rubber-insulated, neoprene-jacketed power cable! Its lighter weight, flexibility of installation, ease of splicing may mean lower installed costs!

With today's trend toward higher and higher voltages, better look into the advantages of Durasheath*—Anaconda's superior-quality rubber-insulated power cable. It may mean big over-all cost savings!

New Anaconda insulating compounds, improved shielding, and advances in cable manufacturing technique have now made it practical to extend Durasheath's voltage range beyond 15 kv . . . to 25 kv . . . and to even higher voltages.

In lower and medium voltage ranges (600 volts to 15 kv), Durasheath has already earned an outstanding reputation for safety, dependability, long life—*and* money-saving versatility. For Durasheath can be installed overhead . . . in ducts . . . and underground, in continuous runs with minimum splices. Its flexibility and light weight are important, too, in cutting the costs of supporting structures.

Now, Anaconda's proven "know-how" in cable construction has made it possible to bring all these advantages to *high-voltage* Durasheath cable! If you're "going up" to higher voltages, see the Man from Anaconda about Durasheath. He will be glad to help you work out your particular problem. Or write: Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York. *Trademark

ANACONDA DURASHEATH ALL-PURPOSE POWER CABLE

Available in all sizes, single and multiple conductor, copper or aluminum, 600 to 15,000 volts and higher.

INSULATION. Type RHW, Anaconda ANW, AHW or AB, each designed for specific purposes and described fully in new publication DM-5817.

JACKET. Specially compounded neoprene with high resistance to flame, oil, acids, alkalies, sunlight and ozone, high tensile strength and flexibility at extremes of temperatures. Densheath (PVC) and Polyethylene jackets are available for special applications.

SEE THE MAN FROM
ANACONDA®
FOR **DURASHEATH CABLE**

Anaconda Durasheath is 3 cables in 1, because . . . it can be installed—

IN DUCTS

AERIALLY

UNDERGROUND

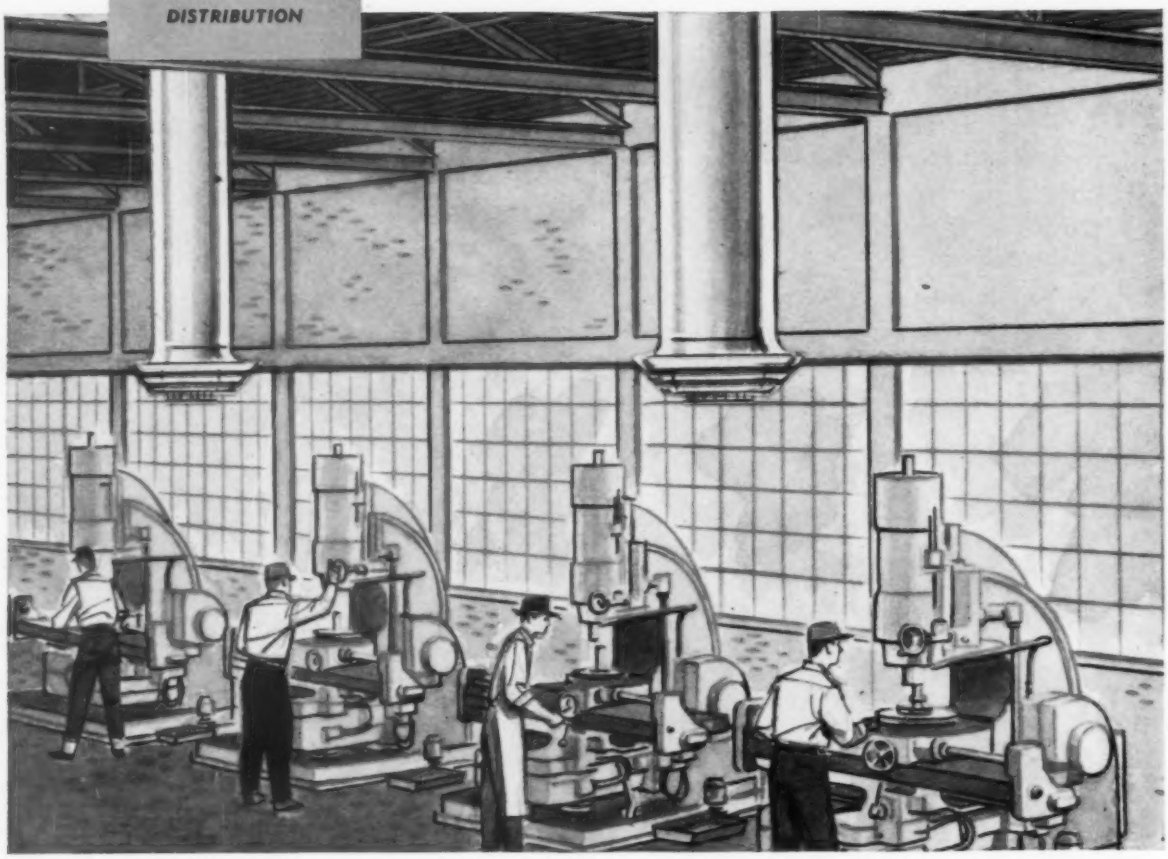
THE MARK OF QUALITY

BARBER COLMAN

Uni-Flo

ENGINEERED AIR DISTRIBUTION

DELIVER FRESH AIR AT WORKING LEVEL WITH VENTURI-FLO INDUSTRIAL DIFFUSERS



Properly distributed make-up air is essential for the health and comfort of manufacturing plant occupants. Failure to provide this comfort factor can result in reduced production and personnel problems.

The new Model BP Venturi-Flo Industrial Diffuser permits air to be piped down to occupancy level — entrainment of stagnant, smoky air in truss space is eliminated. Full range air pattern adjustment permits air to be delivered above the heads of occupants or, to eliminate need for man-cooling fans, directly on occupants. Adjustment is simple *and from the floor* — no need to disassemble the unit. For complete details contact your nearby Barber-Colman Field Office, or write for Catalog F-7722-1.

Only Barber-Colman combines skills in both Air Distribution and Automatic Controls for undivided responsibility.

BARBER-COLMAN COMPANY

Dept. I, 1139 Rock Street, Rockford, Illinois

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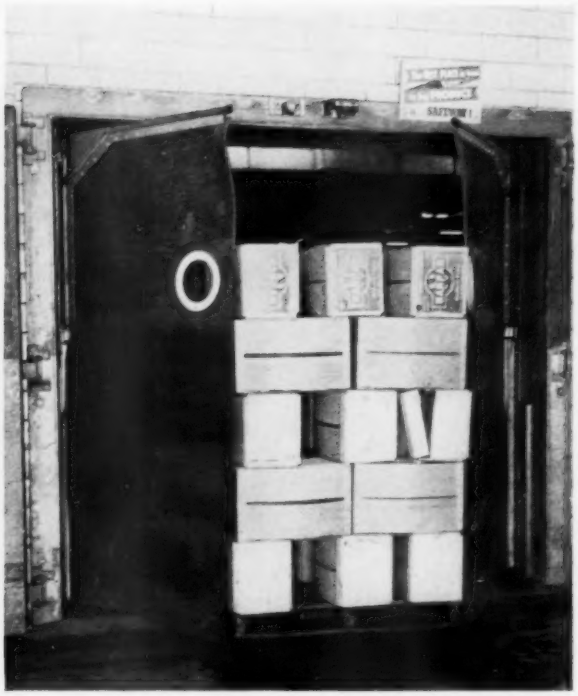


These doors were supplied by the Jamison Cold Storage Door Co.

Flexible "bump-open" door of Du Pont neoprene withstands constant battering in warehouse

This set of neoprene flexible doors was installed at the Safeway Distribution Center in Landover, Maryland, when heavy traffic on the loading dock proved too much for the rigid swinging doors previously used. The refrigerated produce warehouse must be closed to maintain a 52° F. temperature, and Safeway found that the rigid doors in this heavy-traffic area were frequently knocked off their hinges by hand and power trucks.

Constant battering by vehicles and crates of produce has left only superficial scratches on the neoprene doors after 21 months and they move so readily that they won't damage fragile produce. In winter temperatures as low as zero the doors remain flexible. Oil and grease haven't damaged them and there's no sign of cracking or other deterioration.

Other advantages of neoprene synthetic rubber are important in maintenance products: it resists sunlight and weather, many chemicals, ozone and cutting. It won't support combustion. Neoprene insures long, trouble-free service for many products. Your rubber goods supplier can tell you more about industrial uses of neoprene and HYPALON®, a newer synthetic rubber. For more information just send the coupon.

ELASTOMERS IN ACTION HYPALON® • NEOPRENE VITON TRADEMARK

DU PONT
REG. U. S. PAT. OFF.

Better Things for Better Living
. . . through Chemistry

☐ I am particularly interested in _____

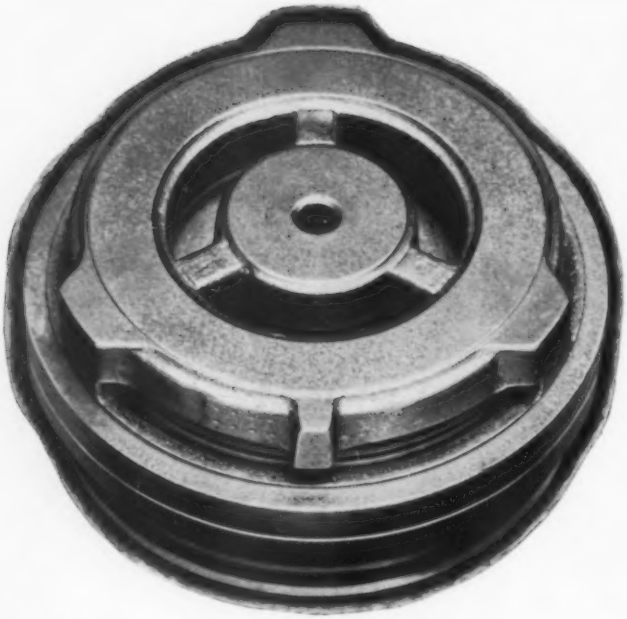
☐ Send me a free copy of *The Du Pont Elastomers* (a review of the properties of neoprene and HYPALON).

☐ Add my name to the free mailing list of the *Elastomers Notebook* (contains articles based on uses of Du Pont elastomers in industry).

E. I. du Pont de Nemours & Co. (Inc.)
Elastomer Chemicals Dept. PL-9
Wilmington 98, Delaware

Name _____
Firm _____
Address _____
City _____ State _____

For more facts circle 575 on Reply Card



*with this valve design**

COMPRESSOR GOING STRONG 36 YEARS AND 4 OWNERS LATER

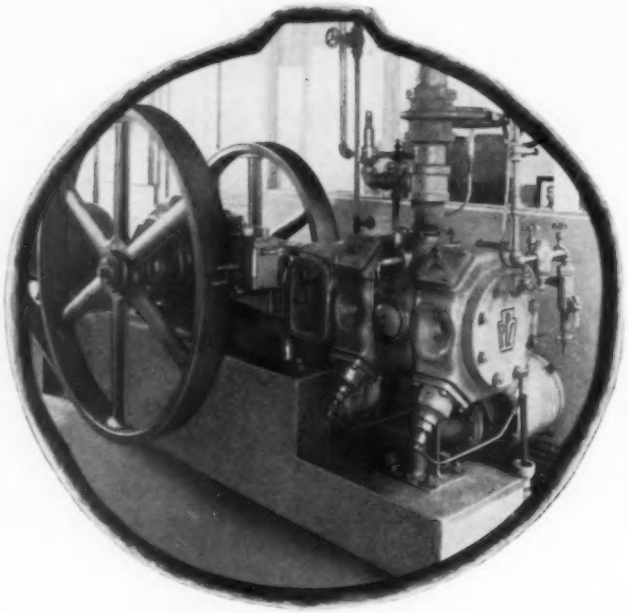
Customers sometimes ask us what it takes to wear out a Pennsylvania compressor.

We don't blame them. Endurance records are extraordinary. Downtime and maintenance costs are extremely moderate.

One Pennsylvania Compressor, for example, originally purchased by a Philadelphia firm in 1922, has been in continuous operation for *36 years!* Moreover, because of mergers or plant alterations, the compressor has changed hands three times and for the last ten years has been delivering as faithfully as ever for its *fourth* owner.

We recently furnished the owner a few replacement parts. Probably, we will be furnishing replacement parts once again in another ten years.

Somewhere in our line is a compressor that will stay on the job for you. Why not write for our brochure COMPRESSORS FOR INDUSTRY describing Pennsylvania compressors from 10 to 350 hp.

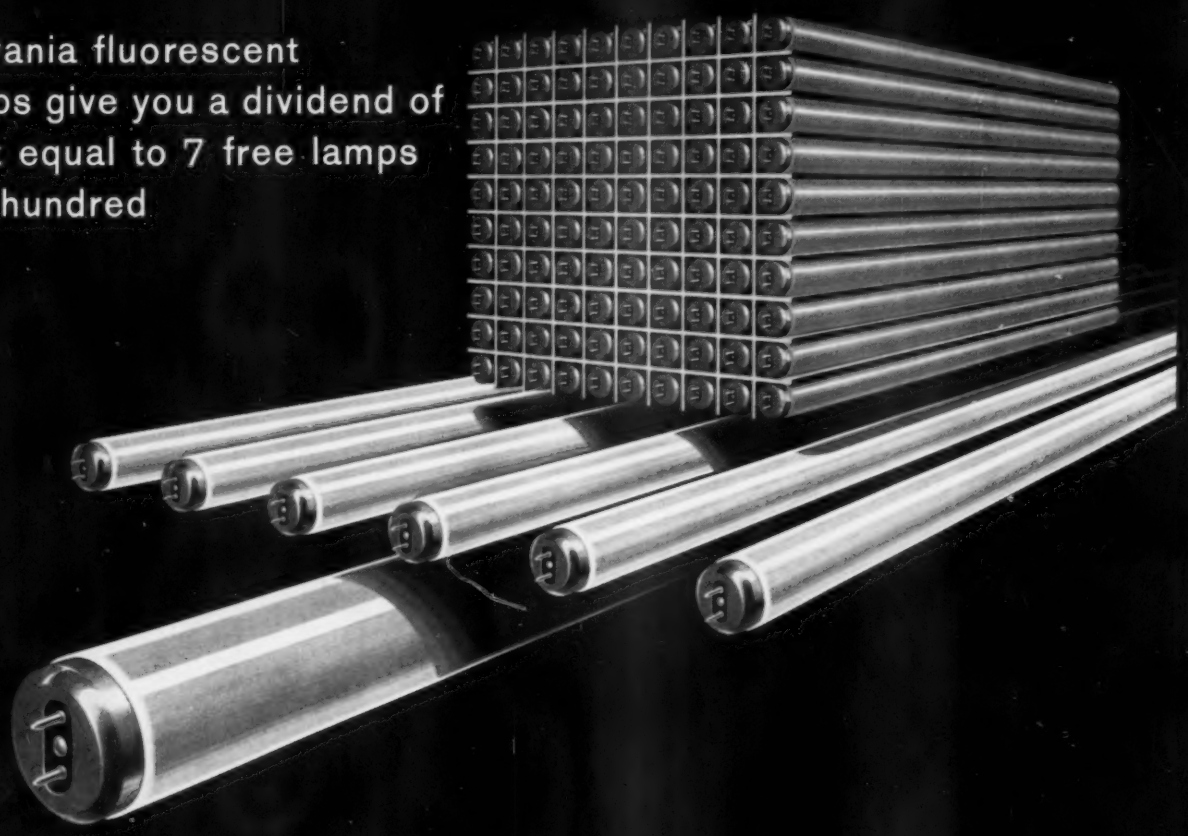


***With this valve,** Pennsylvania compressors will perform faithfully for years. It is the Air Cushion Valve, constructed without nuts, bolts, or screws. Stainless steel valve discs lift against a soft cushion of air; there is no flexing or bending action to weaken them. They will remain perfectly flat and tight seating over long periods of service.

PENNSYLVANIA
PUMP AND COMPRESSOR CO.
Easton, Pa. • Earning Customer Confidence Since 1920

For more facts circle 576 on Reply Card

Sylvania fluorescent lamps give you a dividend of light equal to 7 free lamps per hundred



Sylvania fluorescent lamps consistently deliver more light throughout useful life

Another reason why

Sylvania Fluorescents give you more light at lower cost than all other brands

Advanced engineering makes Sylvania fluorescent lamps superior in many ways—makes light a better tool of production to increase profits

Sylvania lamps deliver more light when new. And they continue to maintain their greater light output throughout useful life by as much as 7%.

For example, at 3,000 hours, in a single-shift operation, 100 Sylvania lamps deliver the light output of about 107 ordinary fluorescents. In effect, you get a Sylvania dividend of light equal to 7 free lamps.

Moreover, this dividend of light means you get more light-per-lamp from the power you buy.

Because of their greater maintained light output, Sylvania fluorescent lamps offer more opportunities for economy. They extend the period between lamp replacements... they reduce work interruption . . . and cut labor costs.

This is another example of how Sylvania builds extra value into fluorescent lamps to help cut your lighting and operating costs.

Let your local Sylvania Representative show you how Sylvania's superiority can save you time and money. Call him today or write:

SYLVANIA LIGHTING PRODUCTS
Division of SYLVANIA ELECTRIC PRODUCTS INC.
60 Boston St., Dept. 8L-7009, Salem, Mass.
In Canada: Sylvania Electric (Canada) Ltd.
Shell Tower Building, Montreal

SYLVANIA Lighting Products

make light a better tool for profits

LIGHTING • TELEVISION • RADIO • ELECTRONICS • PHOTOGRAPHY • ATOMIC ENERGY • CHEMISTRY-METALLURGY

For more facts circle 577 on Reply Card

KLIXON Protectors

Standard Equipment on Flint & Walling Motors

"A KLIXON *motor protector is standard specification in all single phase Flint and Walling motors. The owner of an F & W water system is assured of overload protection because his pump is powered by a Flint and Walling motor protected by a built-in* KLIXON *Protector."*

That's how Lauren D. Eckhart, Chief Engineer of Flint and Walling, producers of domestic and farm water supply equipment, sums up his feelings about KLIXON Protectors.

And Flint and Walling is one more progressive manufacturer who counts on KLIXON Protectors to produce maximum motor performance with minimum failures during periods of overload.

You, too, can get maximum overload capacity with dependable over-temperature protection in the motors that operate your equipment . . . just specify and use KLIXON Protected Motors. Write now for complete details on KLIXON Inherent Protection for single and polyphase motors.

METALS & CONTROLS CORPORATION

Spencer Division 4509 Forest Street, Attleboro, Mass.

KLIXON®

For more facts circle 578 on Reply Card

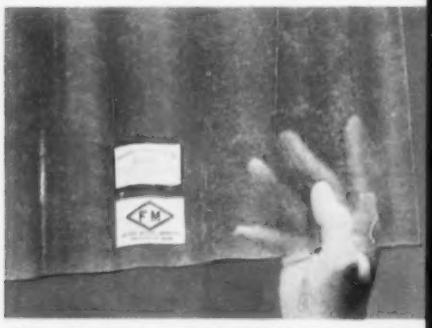
For more facts circle 579 on Reply Card→

Stop window breakage with flat panes of shatterproof Hetron and fibrous glass. They come precut, install like ordinary glass.

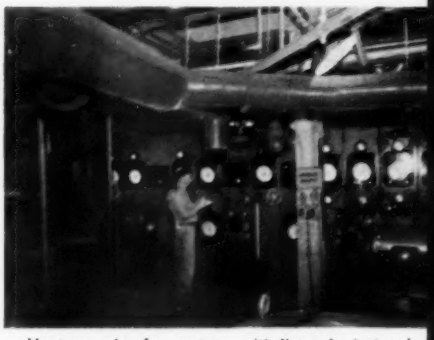
Meet code requirements with a material that's recognized as safe in locations where fire might be a hazard.

Save time on installation with big Hetron-based panels that require no special framing or sash, go up fast because they're so light in weight.

Wash out glare and shadows with light-transmitting areas that relieve eyestrain and fatigue, make your plant more productive.



Remember, not all polyester panels are fire-retardant. Hetron-based panels carry U/L label or Factory Mutual seal of approval.



Vent corrosive fumes, too—with fire-safe ductwork of Hetron-and-glass that outlasts metal, requires little or no maintenance.

These daylighting panels *retard fire*

You can get safer plastic glazing now—with fire-retardant panels made of fibrous glass and Hetron® polyester.

These panels *won't support combustion*—can't contribute to spread of a blaze. They help you keep insurance rates low; meet stiffest code requirements.

At Factory Mutual Laboratories, commercial Hetron-based panels were ignited with a controlled gasoline-vapor fire in a 100-foot-long test building. Roof panels directly above the flames vented in four minutes. Temperatures dropped sharply. The test continued for half an hour—with virtually no further damage to the panels.

Hetron's flame resistance is chemically locked in—resulting in permanent safety. There is no loss of strength, because no additives are used.

These panels *resist corrosive fumes.* They're *shatterproof.* Rocks bounce off them. Blast shock, high winds, severe vibration have no effect on them.

You can get them now from leading fabricators. We make the Hetron resin that goes into them. When you buy, be sure to specify *Hetron-based panels,* or fire-retardant grade.

For a list of fabricators who can supply you, write us now.

DUREZ® HOOKER CHEMICALS PLASTICS

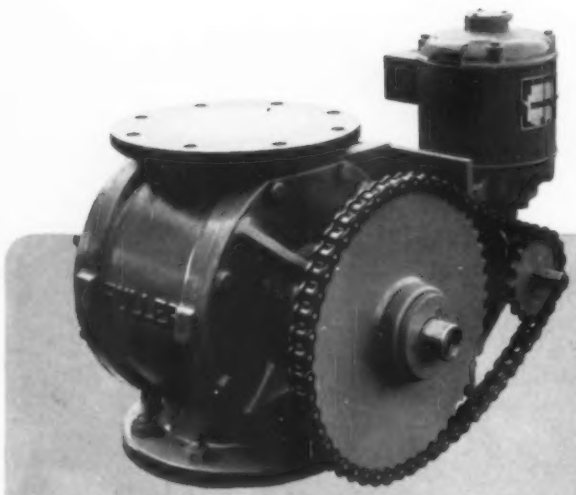
PLASTICS DIVISION

HOOKER CHEMICAL CORPORATION

3909 Walck Road, North Tonawanda, N. Y.

Fuller Feeders
Keep Conveyors Flowing Freely

. . . whether the load
is a few pounds a minute
or many tons an hour



Fuller Vane Type Feeder
with circular flanges.

Fuller Vane Type Feeder
with rectangular flanges.

Fuller Vane Type Feeders assure you of dependable handling of dry, pulverized and granular materials. They're available in capacity ranges to meet all normal plant requirements, and are built with circular or rectangular outlets. Check these Fuller cost-saving features . . .

Extra-rugged construction. Heavy, cast iron body walls and headplates add rigidity, longer life. Stainless or other metals can be used where sanitary or corrosion requirements demand their use.

Sealed bearings are equipped with Alemite fittings for ease of lubrication and long life. Abrasive particles can't enter, maintenance is cut.

Make effective air locks. Fuller Vane Type Feeders can be used as air locks for pressure differentials up to 3½ lbs.

Stuffing boxes and ball bearings for vacuum, low-pressure and general applications.

And, where extreme volumetric accuracy without pulsation is needed, there's a line of Fuller Roll Type Feeders. For full details on Fuller Feeders write for Bulletin.

See Chemical Engineering Catalog for details and specifications . 1306 F-20

FULLER COMPANY GENERAL AMERICAN TRADE MARK

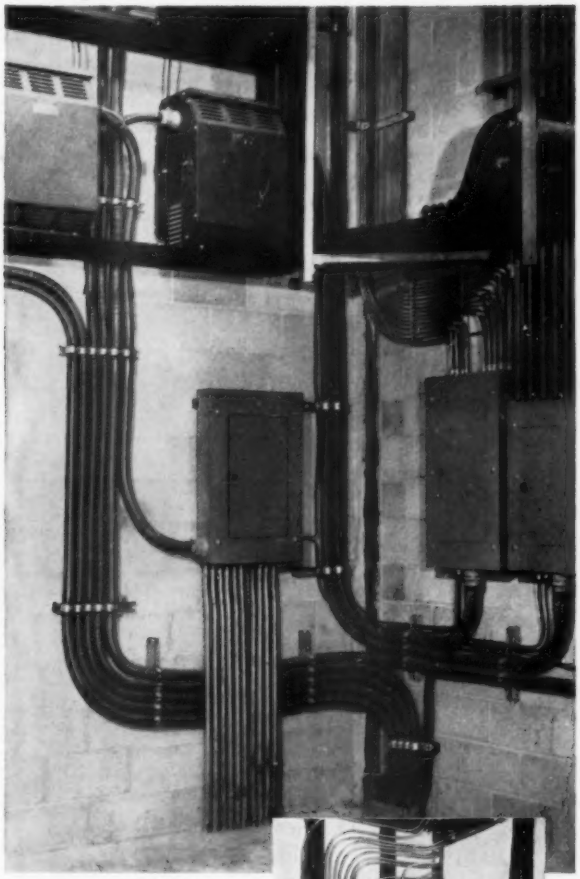
Fuller
....pioneers in harnessing AIR

FULLER COMPANY
138 Bridge St., Catasauqua, Pa.
SUBSIDIARY OF GENERAL AMERICAN TRANSPORTATION CORPORATION
Birmingham • Chicago • Kansas City • Los Angeles • San Francisco • Seattle

For more facts circle 580 on Reply Card

the right combination for industrial power needs!

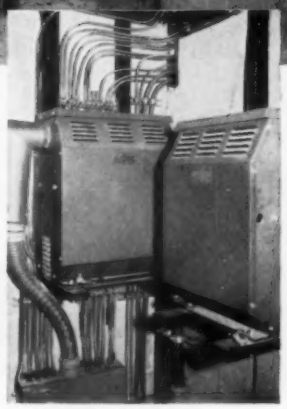
Only General Cable manufactures both...



Installation at the St. Regis Paper Company, Jacksonville, Fla. plant

TYPE M.I. CABLE

for distribution, control and lighting circuits



INTERLOCKING ARMORED CABLE

for primary power feeder circuits

Easy to install in all locations, both Safety M I Cable and Interlocking Armored Cable require no mechanical protection, thus lowering costs of installation and minimizing space requirements. These constructions are easy to train around equipment or structural members, assuring the absolute minimum of interference, and present a neat, functional appearance. In addition, Safety M I Cable has unequalled physical and electrical properties: it is completely resistant to moisture, aging, nearly all chemicals, and operates at continuous high temperatures. For truly modern wiring in your plant, specify Safety M I Cable and Interlocking Armored Cable. And remember; only General Cable makes them both.

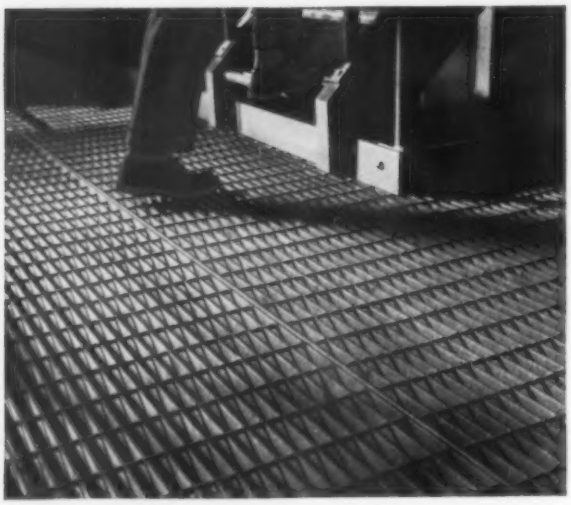
GENERAL CABLE CORPORATION 420 Lexington Avenue, New York 17, N. Y.
Offices and Distributing Centers Coast-to-Coast

for quality and service... **specify GENERAL CABLE**

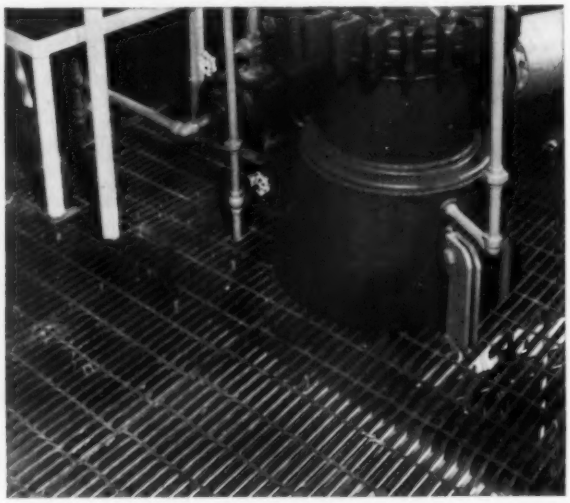
For more facts circle 581 on Reply Card

designed for flexibility...**Electroforged® for strength**
Blaw-Knox Grating fits modern plant needs

More floor space . . . Platforms, mezzanines and loading docks made of flexible Blaw-Knox Electroforged Steel Grating increase storage space, enlarge feeder areas. Easily installed, and easily adapted to changing layouts.



Safer walking . . . on *non-slip* floors, walkways and stairs, Blaw-Knox Electroforged Steel Grating provides rigid one-piece construction and features the twisted cross bar to make every step a safe step.



Fits anywhere . . . around pipes, beams and machinery to provide a neat, easy-to-maintain surface. There's nothing to wear, patch or catch dirt. And Blaw-Knox Grating admits more light and air for ideal working conditions.

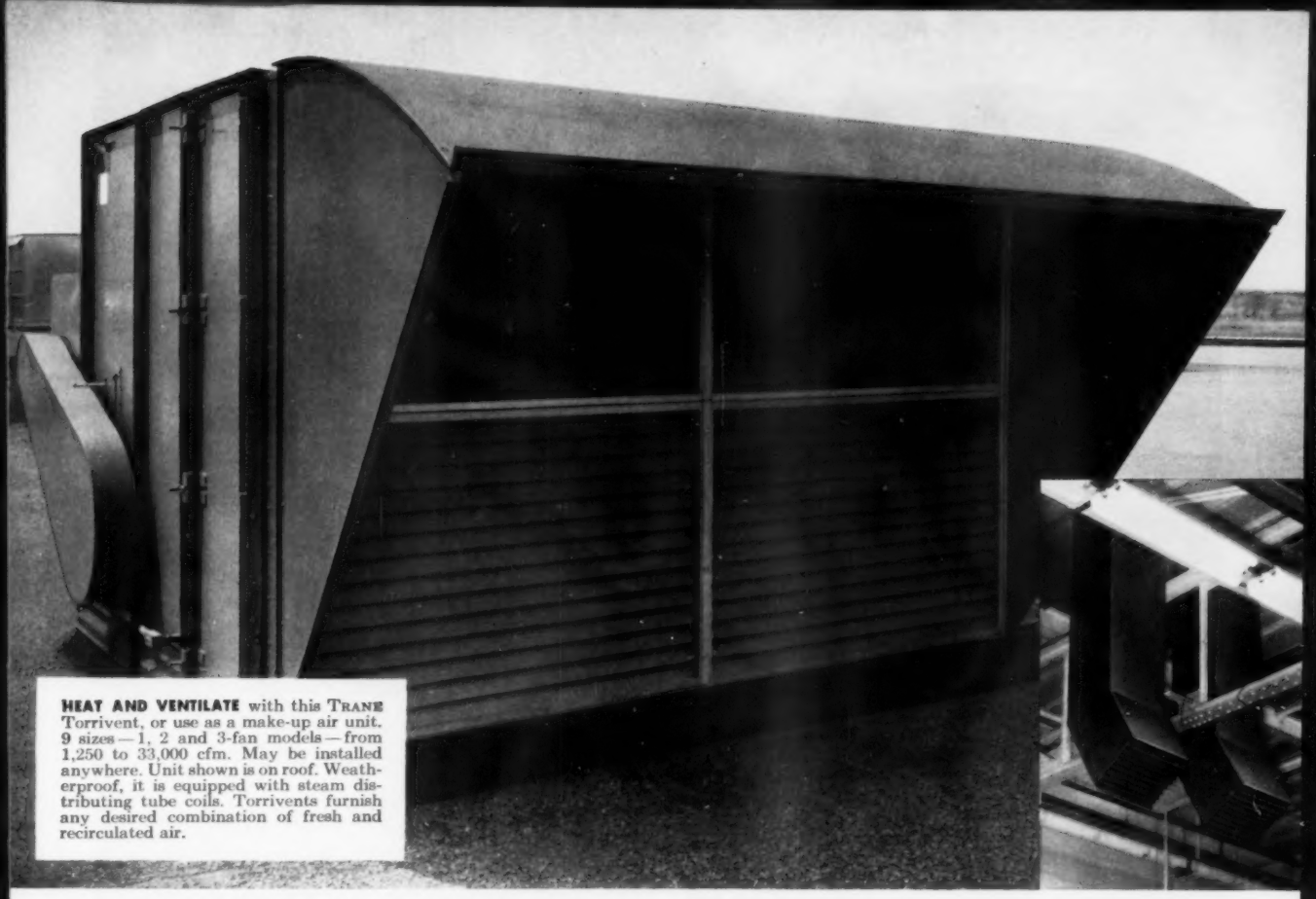
Write for Bulletin 2527 and see how Blaw-Knox Grating can be custom fabricated to meet your plant improvement specifications.

BLAW-KNOX

BLAW-KNOX COMPANY

Equipment Division
Department H, Pittsburgh 38, Pennsylvania

For more facts circle 582 on Reply Card



HEAT AND VENTILATE with this TRANE Torrivent, or use as a make-up air unit. 9 sizes—1, 2 and 3-fan models—from 1,250 to 33,000 cfm. May be installed anywhere. Unit shown is on roof. Weatherproof, it is equipped with steam distributing tube coils. Torrivents furnish any desired combination of fresh and recirculated air.

Stop cold air infiltration in plants quickly, simply with a Trane Torrivent!

Rugged, big-volume heating-ventilating units supply make-up air to equalize exhaust-system loss

Here's how to solve the problem of discomfort conditions caused by adding exhaust equipment to plant heating-ventilating systems. When drafts, uneven heating result from cold air infiltrating around doors and windows, use rugged, high-volume TRANE Torrivent units to supply make-up air, create a positive instead of a negative pressure within the building.

The TRANE Torrivent both heats *and* ventilates. It delivers a large volume of air—fresh or recirculated—heated to uniform temperatures and delivered at uniform velocities. The Torrivent is widely used for curing and drying processes, too. And its exceptionally quiet operation makes it especially suitable for schools, institutions and auditoriums where a high noise level would be objectionable.

Guard against cold air infiltration the next time you plan a job—or correct this condition when it occurs—by incorporating a TRANE Torrivent into the heating-ventilating system. The Torrivent will offset exhaust-system heat loss, provide uniform comfort with lower fuel costs.

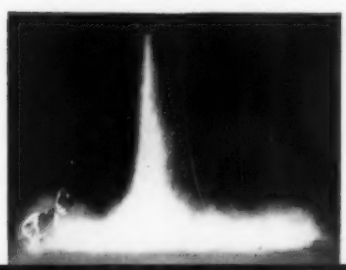
WANT MORE FACTS? For complete information on the Torrivent and other heating-ventilating equipment, call your nearby TRANE Sales Office. Or write TRANE, La Crosse, Wisconsin.

For any air condition, turn to

TRANE

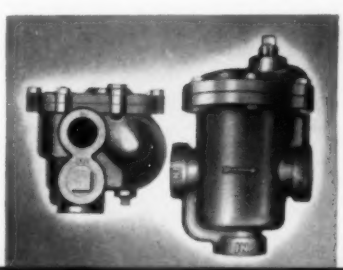
MANUFACTURING ENGINEERS OF AIR CONDITIONING, HEATING, VENTILATING AND HEAT TRANSFER EQUIPMENT

THE TRANE COMPANY, LA CROSSE, WIS. • SCRANTON MFG. DIV., SCRANTON, PA. CLARKSVILLE MFG. DIV., CLARKSVILLE, TENN. • TRANE COMPANY OF CANADA, LIMITED TORONTO • 97 U.S. AND 10 CANADIAN OFFICES



Any Heating Pattern is possible with this TRANE Projection Unit Heater! Exclusive diffusion features provide an almost unlimited number of heating patterns. Projection and Horizontal types available for any application.

Matched Equipment for *all* heating, ventilating equipment! The new, redesigned line of TRANE Steam Specialties saves fuel, gives you *matched* equipment for every job. Traps, strainers, valves, vents for any type of system.



For more facts circle 583 on Reply Card

2 WAY PROTECTION

AGAINST SERVICE STOPPAGE, COSTLY PIPELINE REPAIRS

L·O·F Glass Fibers'
DURATAPE
Joint Wrap
DURATAPE® is especially designed for hot-wrapping by hand. Simply spiral-wrap around pipe joint and lightly flash with a butane torch during and after the wrapping operation.

Steel pipelines are often the very "lifeline" of production. When production lines are stopped because of a pipeline failure, losses are incurred.

Your investment in the serviceability of underground pipelines deserves the best protection possible—the kind of TWO-WAY protection you get from L·O·F Glass Fibers' *Duratape* and *Blue Flag*.

A mesh fabric woven of inorganic glass fiber yarn for extra strength and durability and heavily coated on both sides with coal tar or asphalt, *Duratape* protects field joints and fittings by forming a tough, high-dielectric barrier against corrosion.

Application is fast and easy. Pliable *Duratape* conforms smoothly to irregular contours and provides an extremely tight bond because of its compatibility with primers customarily used in pipeline work.

Specify Blue Flag glass fiber Pipe Wrap and Duramat Outer Wrap on all of your mill-wrapped pipe to help guard against underground corrosion.

For fast installation and long service—USE MILL·WRAPPED PIPE

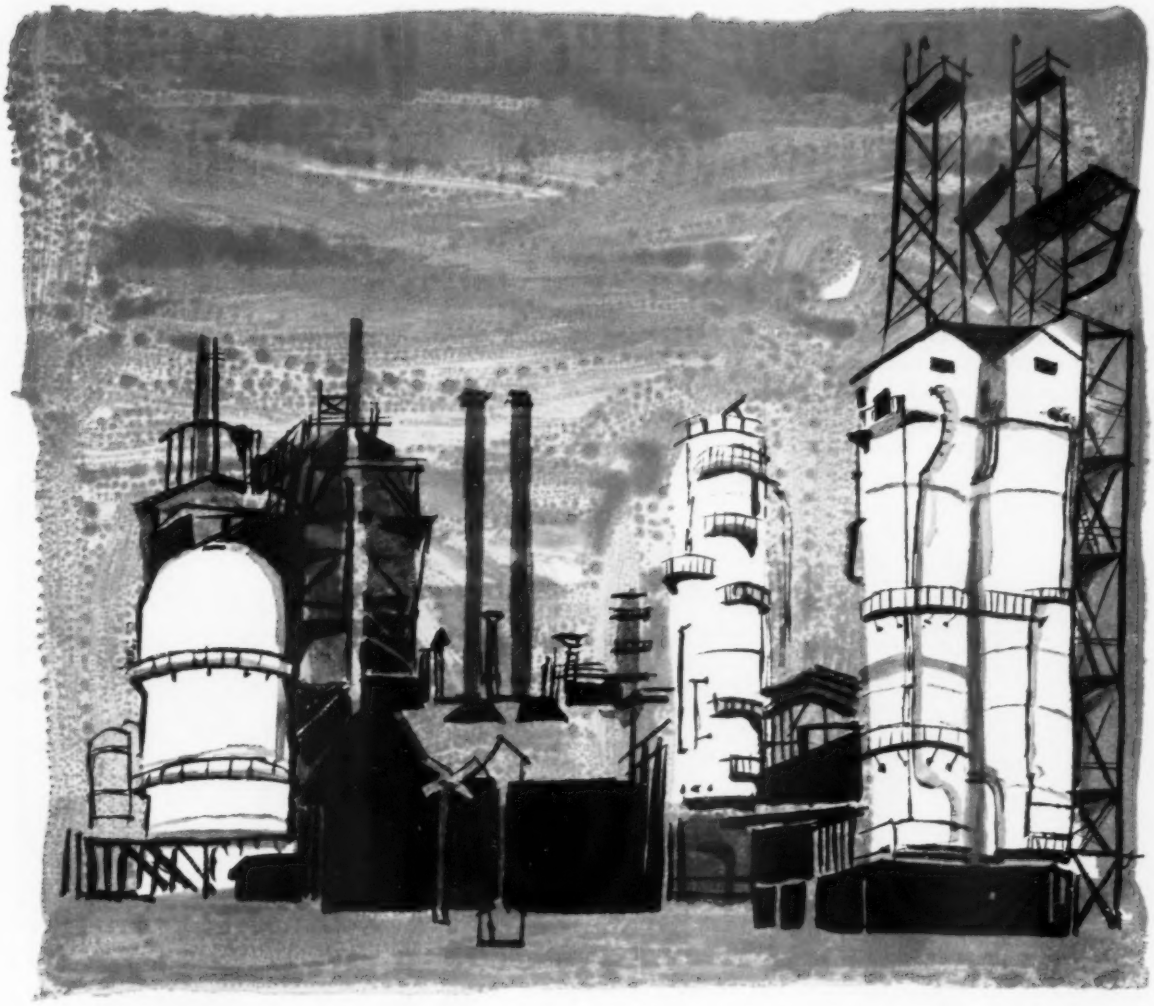
Investigate the benefits of mill-wrapped pipe with coating reinforced by *Blue Flag*, the porous mat made from fibers of special inert glass, which resists the destructive action of soil chemicals. Used to strengthen enamel coating on underground pipelines, *Blue Flag* protects against cracking and backfill damage . . . preserves the pipeline for years beyond its normal life for less than ½ of 1% of its initial cost.

For complete information on how L·O·F Glass Fibers' Pipe Wrap Products can help protect your pipeline investment, write: *L·O·F Glass Fibers Company, Dept. 67-98 1810 Madison Ave., Toledo 1, Ohio.*

L·O·F GLASS FIBERS

L·O·F GLASS FIBERS COMPANY TOLEDO 1, OHIO

For more facts circle 584 on Reply Card



TROPICAL *THERMALITE* ALUMINUM PAINT TAKES 1100° HEAT ON SOHIO CRACKING PLANT

Maintenance people at the Lima Refinery of The Standard Oil Company (Ohio) know a thing or two about heat-resistant paint. Several years ago, they were plagued with paint failures on the regenerator flue gas line of a catalytic cracking plant (where it averages 1100°). Several types of coatings were tried; many of them peeled in a matter of weeks.

Then Sohio tested Tropical *Thermalite*, a paint specifically formulated with ALCOA® Aluminum Pigment to withstand high heat. Results were eye opening. *Thermalite* has been a standard at Standard ever since. The average application lasts two years, provides a clean, silver-bright finish that sets off the entire plant.

A good heat-resistant aluminum paint such as *Thermalite* can be brushed or sprayed. When applied to clean metal and heated to high temperature, it fuses to the surface, provides a weatherproof shield that prevents surface corrosion and deterioration.

ALCOA does not make paint, but ALCOA Pigments are used in more aluminum paints than any other brand. Special formulas have been developed by paint manufacturers to solve individual problems. Paints made to these formulas actually cost less, last longer, give utmost protection against heat, cold, sun, rain, smoke and fumes.

Write today for our two free booklets, *Painting With Aluminum* and *Aluminum Asphalt Roof Coatings Make Time Stand Still.* Use the coupon.

High heat of the regenerator flue gas line on a catalytic cracking plant presented paint problems at Sohio's Lima Refinery until they tried *Thermalite* Aluminum, heat-resistant paint manufactured by Tropical Paint Co., Cleveland, Ohio.

Look for this label when you buy aluminum paint

PIGMENTED WITH ALCOA ALUMINUM

ALUMINUM COMPANY OF AMERICA

ALCOA THEATRE
Fine Entertainment
ALTERNATE MONDAY EVENINGS

Aluminum Company of America
1790-J Alcoa Building, Pittsburgh 19, Pa.

Please send your free booklets:

- ☐ *Painting With Aluminum*
- ☐ *Aluminum Asphalt Roof Coatings Make Time Stand Still*

Name_____

Company_____

Address_____

City_____ Zone____ State____

For more facts circle 585 on Reply Card

top firms give Dracco Dust Control continuing vote of confidence

■ One of the best guides to product performance is the record of repeat sales to recognized industrial leaders.

A large number of firms repeatedly specify Dracco Dust Control for new plant facilities or cost-cutting modernization programs. Typical examples are ten companies whose records are shown. All are among "The 500 Largest U.S. Industrial Corporations" listed by Fortune Magazine. Many have *standardized* on Dracco.

Implicit in these records are the superior performance, low maintenance and long service life of Dracco Dust Control Equipment. We invite you to judge our product "by the companies it keeps"—the other leaders in your industry.

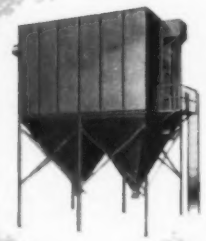
Consult Dracco first on all problems of dust control or recovery.

DRACCO DIVISION OF FULLER CO.
4035 East 116th Street • Cleveland 5, Ohio

TYPICAL PURCHASE RECORDS* — 1948-1957
DRACCO DUST CONTROL EQUIPMENT
(we could have chosen many others)

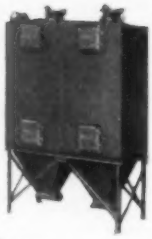
TYPE OF COMPANY	NUMBER OF ORDERS	TOTAL DRACCO UNITS PURCHASED
chemicals	49	60
chemicals	13	28
chemicals	17	25
chemicals	14	19
refractories	35	54
refractories	8	27
mining	8	90
rubber	37	48
cement	15	31
stone products	14	15

*names on request



Multi-Bag Filters

Whirl-Clones



Dustomatic Filters

Uni-Filters

"DH" Filters

Complete 40-page catalog on Dracco Dust Control Equipment contains detailed data and valuable reference material. Write for Bulletin 800.

DRACCO *airstream* conveyors
dust control equipment

For more facts circle 586 on Reply Card

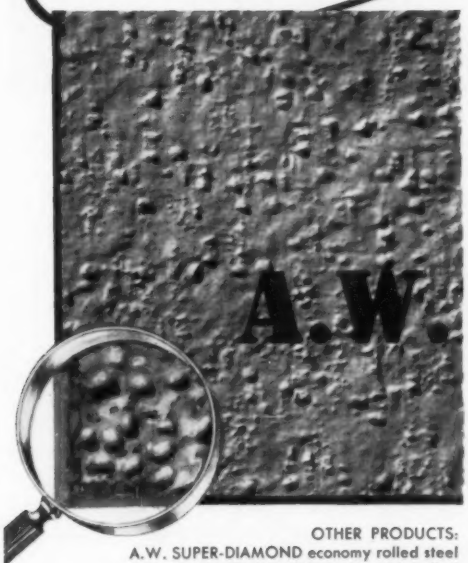
Ma'm'selle has not made the slip once, since she installed A. W. ALGRIP!

Other slips . . . maybe, but never one on A.W. ALGRIP. Ma'm'selle has learned that A.W. ALGRIP won't slip . . . no matter how wet the surface. And if Ma'm'selle owned your plant, no doubt she would install A.W. ALGRIP . . . all ze way aroun'! There are many advantages.

Yes, anywhere you install A.W. ALGRIP, you can forget about slippery surfaces. Hazardous slipping conditions disappear. Work efficiency increases while accident rates and insurance costs drop.

A.W. ALGRIP Rolled Steel Floor Plate is made by a patented process in which a grinding wheel type abrasive is rolled—*not coated*—to a controlled depth, as an integral part of tough steel plate. Wear merely exposes more abrasive . . . safety lasts for the life of the installation.

Check your plant for slipping hazards. A.W. ALGRIP provides super-safe footing under the most hazardous conditions—even on inclined surfaces. Send coupon for A.W. ALGRIP information, today.



OTHER PRODUCTS:
A.W. SUPER-DIAMOND economy rolled steel floor plate—Plates—Hot and cold rolled sheet and strip—(Alloy and Special Grades)

ALGRIP ABRASIVE ROLLED STEEL FLOOR PLATE

ALGRIP—*approved for safety by Underwriters' Laboratories*

ALAN WOOD STEEL COMPANY
Conshohocken, Pa.

Please send A.W. ALGRIP Booklet AL-E29

Name_____

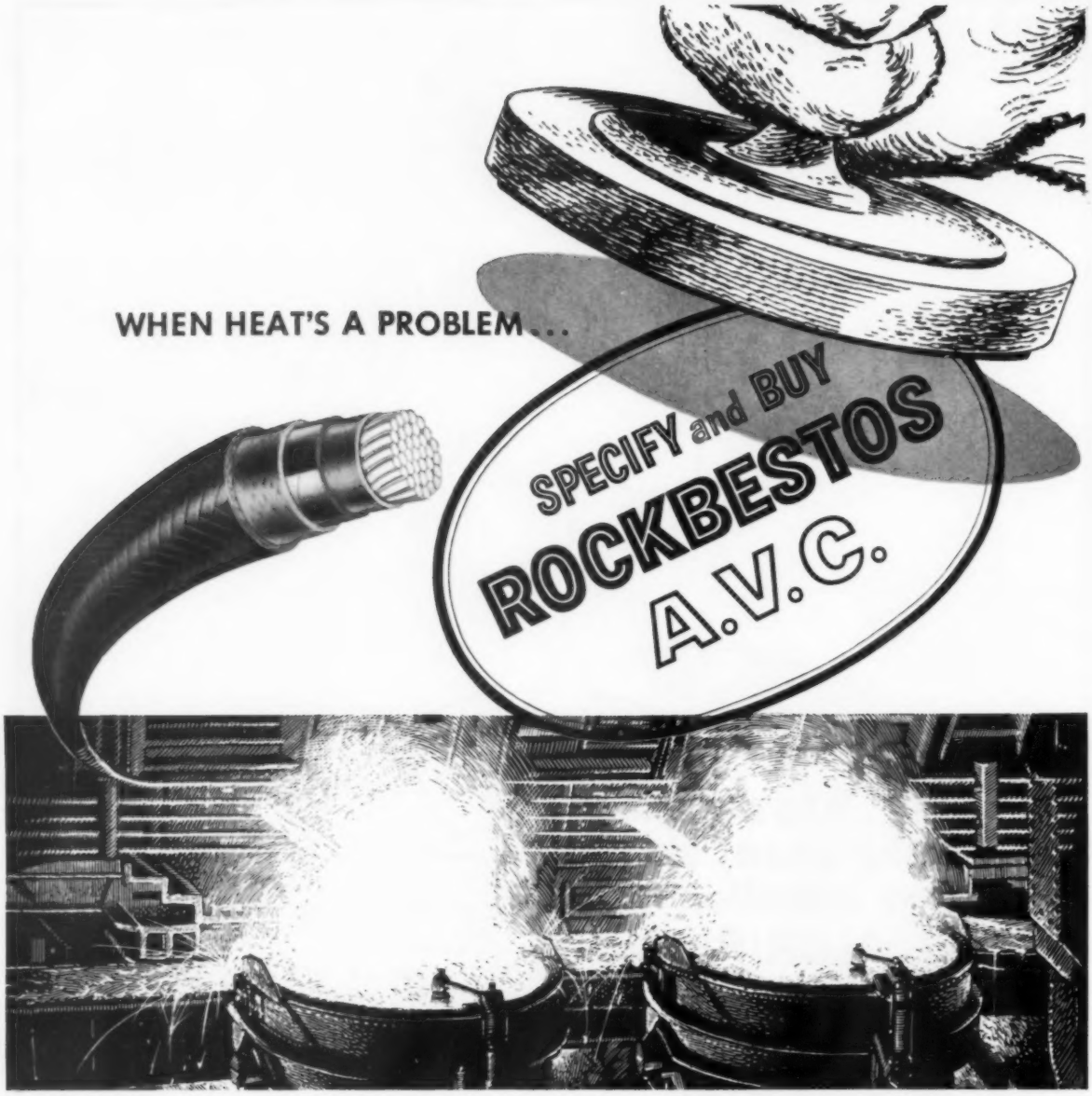
Title_____

Company_____

Address_____

City_____ Zone_____ State_____

For more facts circle 587 on Reply Card



Steel Mill and Foundry "hot spots" provide one of industry's worst torture chambers for wire and cable. Heat, overloads and corrosive fumes combine to kill ordinary cable quickly.

Don't take a chance on ordinary cable for troublesome "hot spot" applications. *Specify and use Rockbestos A.V.C.*

This superior AVA cable, with asbestos, varnished cambric insulation, takes temperatures up to 230°F, assuring continuous operation in hot spot applications, provides greater current carrying capacity for increased and new loads.

When you *specify and buy Rockbestos A.V.C.*, you reduce your electrical maintenance and construction costs . . . you get years more dependable service.

Write now for the new Rockbestos RSS-88 to help you *specify and buy Rockbestos A.V.C.*

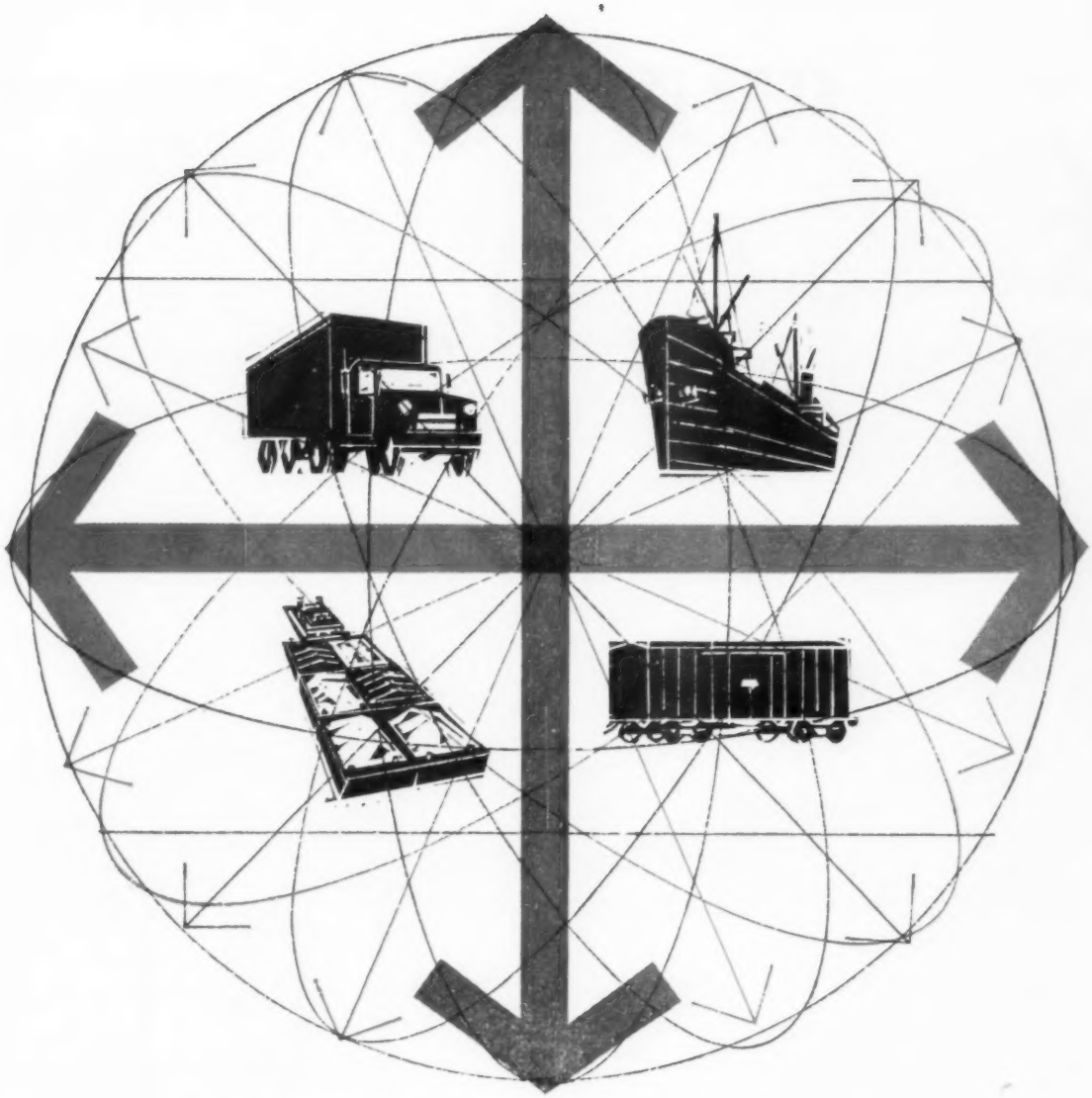
ROCKBESTOS PRODUCTS CORPORATION
NEW HAVEN 4, CONNECTICUT

NEW YORK • CLEVELAND • DETROIT • CHICAGO • OAKLAND
PITTSBURGH • ST. LOUIS • LOS ANGELES • SEATTLE • ATLANTA • DALLAS

ROCKBESTOS A.V.C.

THE SUPERIOR A.V.A. CABLE

For more facts circle 588 on Reply Card



Morton delivers every kind of salt under the sun; by boat, barge, train and truck. And only Morton offers you fast delivery on a bag to thousands of tons, anywhere in the country.

Only Morton can offer you the right salt for every industrial use, coast to coast

Morton, the only nation-wide salt company, produces, refines, and delivers nearly 100 different grades of salt for 14,000 industrial uses.

This means that regardless of your size, your needs, or your location, Morton can give you expert, impartial advice on which grade or grades will do the best job for you. This is valuable advice because the right salt for the right job will help you reduce costs, save time and turn out products of uniform high quality.

How Morton service can save you money

Morton backs its salesmen with the services of the finest salt research center in the world. If your Morton salesman personally can't solve a salt problem for you, he can refer the problem to Morton's research laboratory for quick, thorough analysis. This service help may be worth thousands of dollars to you every year.

We think you'll find it well worthwhile to talk salt and service with a Morton representative. If you agree, just write or wire:

MORTON SALT COMPANY

INDUSTRIAL DIVISION

Dept. PE-9-58, 110 N. Wacker Drive
Chicago 6, Illinois

For more facts circle 589 on Reply Card

KEEP IT CLEAN by Phil Tration

In searching for sea-buried treasure,
Consider the worth of this measure:
When oxygen's rare, just filter fresh air
Through Staynew for deep-breathing pleasure.

Thank goodness you don't have to search so deep and far to find uses for Dollinger Filters. Any liquid, any gas (you name it) can be efficiently and economically handled by them. You'll find applications everywhere: in pipelines to prevent damage by rust and dirt; in ventilating systems to reduce air-borne impurities; on compressors and engines to prevent cylinder and piston damage by foreign matter. Let us know your filtration problems.

STAYNEW MODEL CPH PIPE LINE FILTER

has the exclusive "double action principle." Air is first deflected to outer walls of Filters and forced downward at high speed. Water, oil, and heavier particles of rust, etc. are thus deposited in base. Mechanically cleaned air then rises to pass through filtering medium which removes lighter airborne particles. This "double action" design eliminates need for frequent cleaning.

Inexpensive, simple to install, Dollinger Pipe Line Filters pay for themselves in reduced maintenance alone. Why not talk over your filtration problems with a Dollinger engineer . . . or write for Bulletin 200 which gives engineering data on pipe line filters. Dollinger Corporation, 55 Centre Park, Rochester 3, N. Y.

REG. PROTECTOMOTOR U.S. PAT. OFF.

STAYNEW **DOLLINGER** FILTERS

SPECIALIZING IN DRY TYPE FILTERS FOR OVER 35 YEARS

LIQUID FILTERS • PIPE LINE FILTERS • INTAKE FILTERS • HYDRAULIC FILTERS • ELECTROSTATIC FILTERS • MIST COLLECTORS • DRY PANEL FILTERS • SPECIAL DESIGN FILTERS • VISCOUS PANEL FILTERS • LOW PRESSURE FILTERS HIGH PRESSURE FILTERS • AUTOMATIC VENTILATION FILTERS • NATURAL GAS FILTERS • SILENCER FILTERS

For more facts circle 590 on Reply Card

Now's the time to prevent freezing of heater coils... with Production Planned steam trapping

By John W. Ritter, Test Engineer, SARCO Company, Inc.

Freezing of heating coils usually takes place when outside air temperature is slightly below the freezing point, and it is most common in coils that have the steam supply controlled by a temperature regulator which keeps the outlet air temperature constant. Freezing can occur only when the coil becomes water-logged, and in this case the steam trap is often blamed for the trouble.

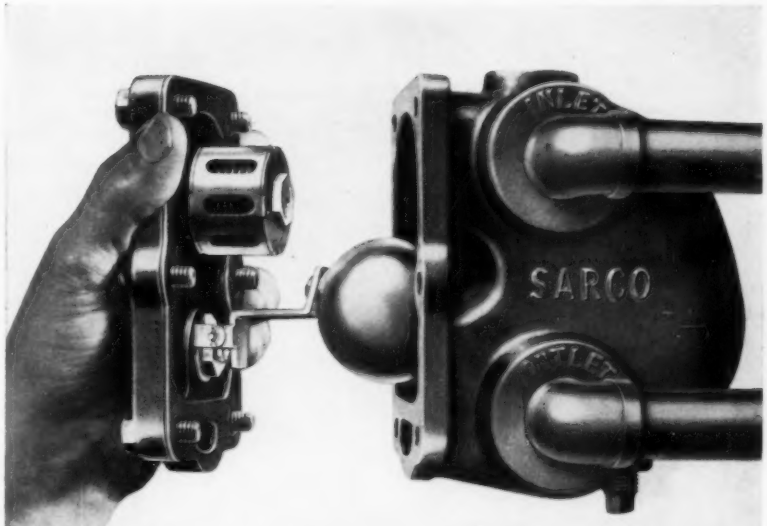
The discharge capacity of any steam trap depends upon the difference in pressure between the trap inlet and its outlet. If there is no pressure difference, the trap cannot remove condensate; and if inlet pressure is lower than outlet pressure, condensate will be held back in the coil.

There are three ways to avoid this difficulty. First, a pressure controlled bypass can be arranged around the temperature control valve to prevent heater pressure from falling below a preset minimum. This plan would make the temperature controller ineffective over part of the range of outside air temperature.

A better solution is to install the steam trap well below the unit, and thus provide a hydraulic leg to enable the trap to discharge even with a vacuum in the steam space. An ample sized vacuum breaker should be installed at the top of the steam inlet of the heater.

To compute the hydraulic head needed, use a figure of 3′ per 1 psi pressure differential. For example, if the trap has the required capacity at 1 psi differential, the minimum head will be 3′.

Thirdly, on new construction, the preheater can be divided into two sections. The first should be capable of raising the air to at least 32° under minimum outside air conditions. The second section should raise the air from 32° to the final temperature. Full steam is supplied to the first coil at all times, while the second is controlled to maintain the final temperature needed. The first coil will not freeze because of the maintained pressure, nor will the second, because minimum air temperature is always above 32°.



Air binding is impossible with this new Sarco Float-Thermostatic Steam Trap. Requires no adjustment when pressures change. Available in sizes of ¾" and 1", for steam pressures from 0 to 125 psi.

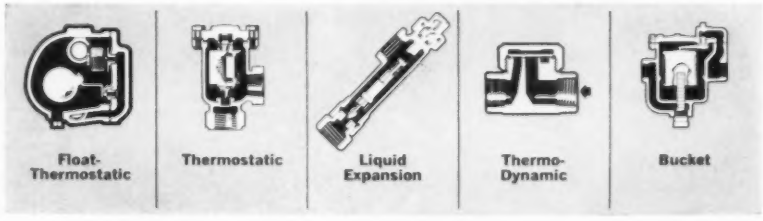
A SARCO F-T Steam Trap will drain condensate completely

Count on the Sarco Float-Thermostatic Steam Trap to discharge condensate practically at steam temperature, continuously and without shock. Sarco F-T's do not cause pressure fluctuation while discharging.

For *production planned* trapping of heating coils, with accurate temperature control, use the new Sarco Steam Trap Type F-T.

Write for Technical Bulletin T502 on prevention of freezing in heater coils. You'll also receive a bulletin on Sarco F-T Steam Traps.

Remember that Sarco can give you *impartial* advice on steam trapping because only Sarco makes all 5 types. 5968-B



SARCO
COMPANY, INC.
635 Madison Ave., New York 22, N. Y.

Only Sarco makes all 5 types:
Thermostatic • Liquid Expansion • Float Thermostatic
Thermo-Dynamic • Bucket

STEAM TRAPS • TEMPERATURE CONTROLLERS • STRAINERS • HEATING SPECIALTIES

For more facts circle 591 on Reply Card

Rolling Steel Doors

Manually, Mechanically, or Electrically Operated

MAHON CHAIN-GEAR OPERATOR

MAHON STANDARD POWER OPERATOR 920-P

Whether it be for a railroad opening, truck opening, or shipping dock opening, a good rolling steel door offers definite timesaving and space-saving advantages. The fast, vertical roll-up action of the door curtain requires no usable space either inside or outside the opening . . . there are no overhead tracks or other obstructions to restrict headroom and interfere with crane handling. And the all-metal construction of rolling steel doors reduces maintenance to a minimum and provides maximum protection against intrusion and fire. No other type of door can give you all of these desirable features. When you select a rolling steel door, check specifications carefully . . . you'll find, through comparison, that Mahon Rolling Steel Doors are built better to give you better service over a longer period of time. See Sweet's Files for complete information including specifications, or write for Mahon Catalogue G-58.

THE R. C. MAHON COMPANY • Detroit 34, Michigan

Sales-Engineering Offices in Detroit, New York and Chicago • Representatives in Principal Cities

Manufacturers of Rolling Steel Doors, Grilles, and Automatic Underwriters' Labeled Rolling Steel Fire Doors and Fire Shutters; Underwriters' Rated Metalclad Fire Walls, Insulated Metal Curtain Walls, Electrified M-Floors, Acoustical and Troffer Forms, Acoustical Metal Ceilings, Steel Roof Decks, and Long Span M-Decks.

ROLLING STEEL DOORS, SHUTTERS AND GRILLES TO MEET EVERY REQUIREMENT

Mahon Power Operated Rolling Steel Doors installed in a railroad opening, a truck opening, and two loading dock openings in a new building for Samuel G. Keywell Co., Inc., Detroit, Michigan. Campbell Engineering Co., Designers. H. F. Campbell Construction Co., General Contractors.

MAHON

For more facts circle 592 on Reply Card

Walkway to efficient dust control

Pangborn Cloth Bag Dust Collector on the job. This is just one of Pangborn's complete line of wet and dry dust collectors.

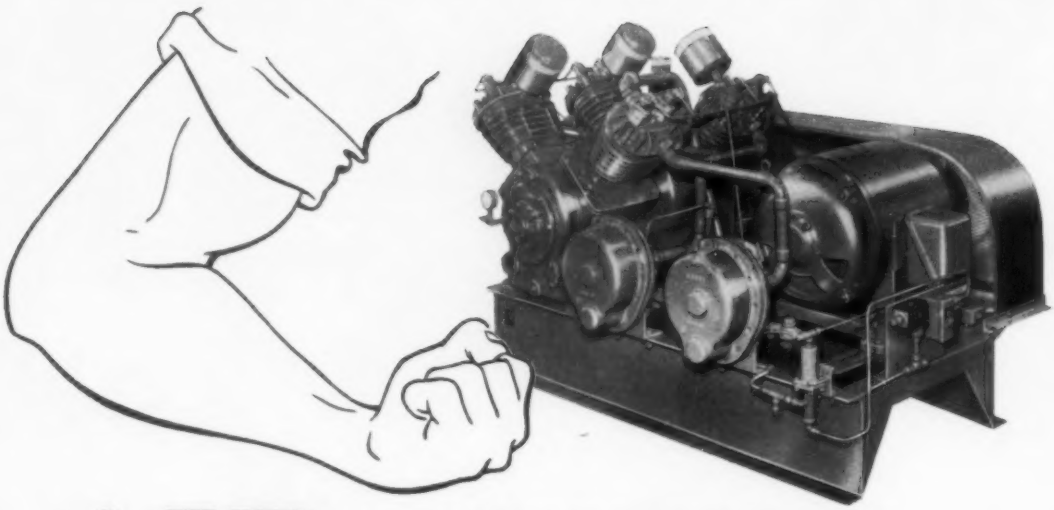
See those bags? They're the *collect* in the Pangborn Cloth Bag Dust Collector. And they're efficient! The cloth filter has proved the most practical method for collecting finely divided dry dusts. But Pangborn goes a step further. Pangborn engineering has not only adapted this design to increase its collecting effectiveness but has simplified its construction. This means you save money. The Pangborn Cloth Bag Collector offers maximum efficiency, yet is economical to buy, install and operate.

Pangborn engineering is important to every dust-producing plant, regardless of the kind of collector needed. It is not enough to put a dust collector within a plant. An efficient dust collecting system must be *scientifically* planned, designed and constructed to handle effectively a specific dust problem. This thinking is incorporated into every Pangborn proposal.

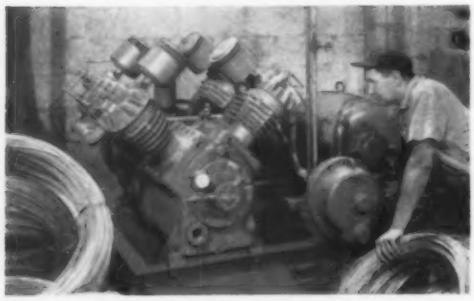
The Pangborn Engineer in your area will be glad to go to work for you. He is a dust expert *and will discuss your individual problem at no obligation. And, for more information, write for Bulletin 922 to:* Pangborn Corp., *3200 Pangborn Blvd., Hagerstown, Md. Manufacturers of Dust Control and Blast Cleaning Equipment.*

Pangborn CONTROLS DUST

For more facts circle 593 on Reply Card



AIR: ANOTHER ARM for INDUSTRY



Typical installation at Conver Steel and Wire Company, New York. Used to operate spot welders, benders, paint mixers and for clamping, holding, riveting, etc.

BRUNNER
SINCE 1906

AIR COMPRESSORS

To be of consistent value in industry, compressed air must be generated economically by equipment which assures low installation expense and keeps maintenance costs to a minimum.

The BRUNNER compressor meets every test . . . and, in addition, offers these advantages:

It's furnished in either single stage or two stage—to suit your needs.

It's compact! A complete, packaged unit with water-cooled intercoolers and aftercoolers mounted.

It's a space saver requiring minimum room.

It's versatile! Capacity is economically controlled to meet every variety of air demand.

It's rugged! Continuous oil filtering means less wear, longer life.

Single and two stage base mounted electric motor driven units, complete with controls of your choice. Single stage units offered in 80 or 100 P.S.I. ratings of 25-30-40 and 50 H.P. sizes. Two Stage units offered in 125 or 150 P.S.I. ratings of 25-30-40 and 50 H.P. sizes.

For complete details request Catalog 37.

Heat-X Air Compressor Aftercooler with inner-fin construction provides maximum heat transfer with minimum air pressure drop.
Available in WIA (water-cooled) or RIA (refrigerated) models for compressed air systems from 10 to 1500 CFM.

Request Catalog 8065.

BRUNNER DIVISION
DUNHAM-BUSH, INC.
UTICA, NEW YORK

DUNHAM-BUSH

AIR CONDITIONING • REFRIGERATION • HEATING • HEAT TRANSFER
WEST HARTFORD, CONNECTICUT • MICHIGAN CITY, INDIANA • MARSHALLTOWN, IOWA
RIVERSIDE, CALIFORNIA • BRUNNER DIVISION, UTICA, NEW YORK
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heat-x HEAT-X, INC., BREWSTER, N.Y.
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BRUNNER BRUNNER CORPORATION (CANADA) LTD., PORT HOPE, ONTARIO

For more facts circle 594 on Reply Card

meet Jenny . . . the girl with the magic touch

HOW DO YOUR CLEANING COSTS STACK UP AGAINST JENNY'S ?

40-Ton Toggle Press	3 Hours
Automatic Screw Machine	5 Hours
Steel Mill Windows, per 30 panes	15 Minutes
Garage Floors, per 30 sq. ft.	10 Minutes
Machine Shop Floors, per 15 sq. ft.	15 Minutes
8-Ton Woodworking Machine	2 Hours
Overhead Crane Rail Girders, per 6 ft. section	15 Minutes
Pipe Threading Machine	30 Minutes
Small Drill Press	20 Minutes
Railroad Tank Car	2 Hours

Jenny® SERIES 1800 STEAM CLEANER

SERIES 1800 . . . one of 80 different models and types.

Maintenance superintendents report that Hypressure Jenny cuts cleaning time to one-tenth the time required by ordinary methods. Reduces down-time to a minimum. Regardless of how large or how small your cleaning job, there is a Hypressure Jenny to fit your requirements. In addition, the revolutionary Jenolizing process prevents rust after steam cleaning. Write for details now.

h
v

HOMESTEAD VALVE MANUFACTURING COMPANY
Hypressure Jenny Division • Coraopolis, Pennsylvania

Please send me information on "How Industry Gets More Productive Hours" with Hypressure Jenny Steam Cleaners. 207

Name_____

Street_____

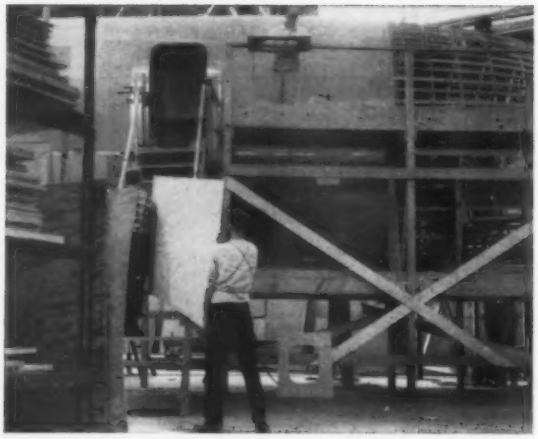
City_____ Zone____ State_____

For more facts circle 595 on Reply Card

DURABLE

Exterior plywood filter frames last longer, cost less

One piece fir plywood filter frames used with electrolytic fluids in powdered metal production cost 40 per cent less than conventional lumber frames. Frames, shown here being cleaned, cut fabrication time and costs and also eliminate joints and fastenings which might work loose. Plywood prevents frames from racking out of shape. Despite the fact that they weigh much less and take up only half as much room as the bulkier lumber frames (shown at left), they stand up longer under constant immersion in the highly acid solutions used in the electrolytic process.



WORKABLE

Fir plywood simplifies complex aircraft mock-ups

Fir plywood is the basic raw material used in this full-size mock-up of Douglas Aircraft Company's giant DC-8 jet transport. Over 180 feet long, this plywood prototype permits engineers to make most efficient placement of components. Cross-laminated for two-way strength, plywood is easy to cut to intricate shapes, machines to tight tolerances and bends easily to required curvatures. Panels are light, cover big areas fast. Moving gears, control panels, wheels and other parts in addition to fuselage skin are mocked up in plywood.

LOW COST

Plywood templates help Ryan cut fabrication costs

Ryan Aeronautical Co., San Diego, saves hundreds of dollars each month by an ingenious use of fir plywood templates for photographic layouts. Actual size plywood shapes of parts to be obtained from metal sheets are arranged to determine optimum cutting layouts. Pictures are taken with a polaroid camera and data is given to production crews within minutes after the layout is approved. Aside from being faster and more accurate, use of these low cost plywood templates has cut Ryan's output of scrap by about 25 per cent. Templates also help fair plaster mock ups and are used for routing tool components during cutting operations.

FIR PLYWOOD

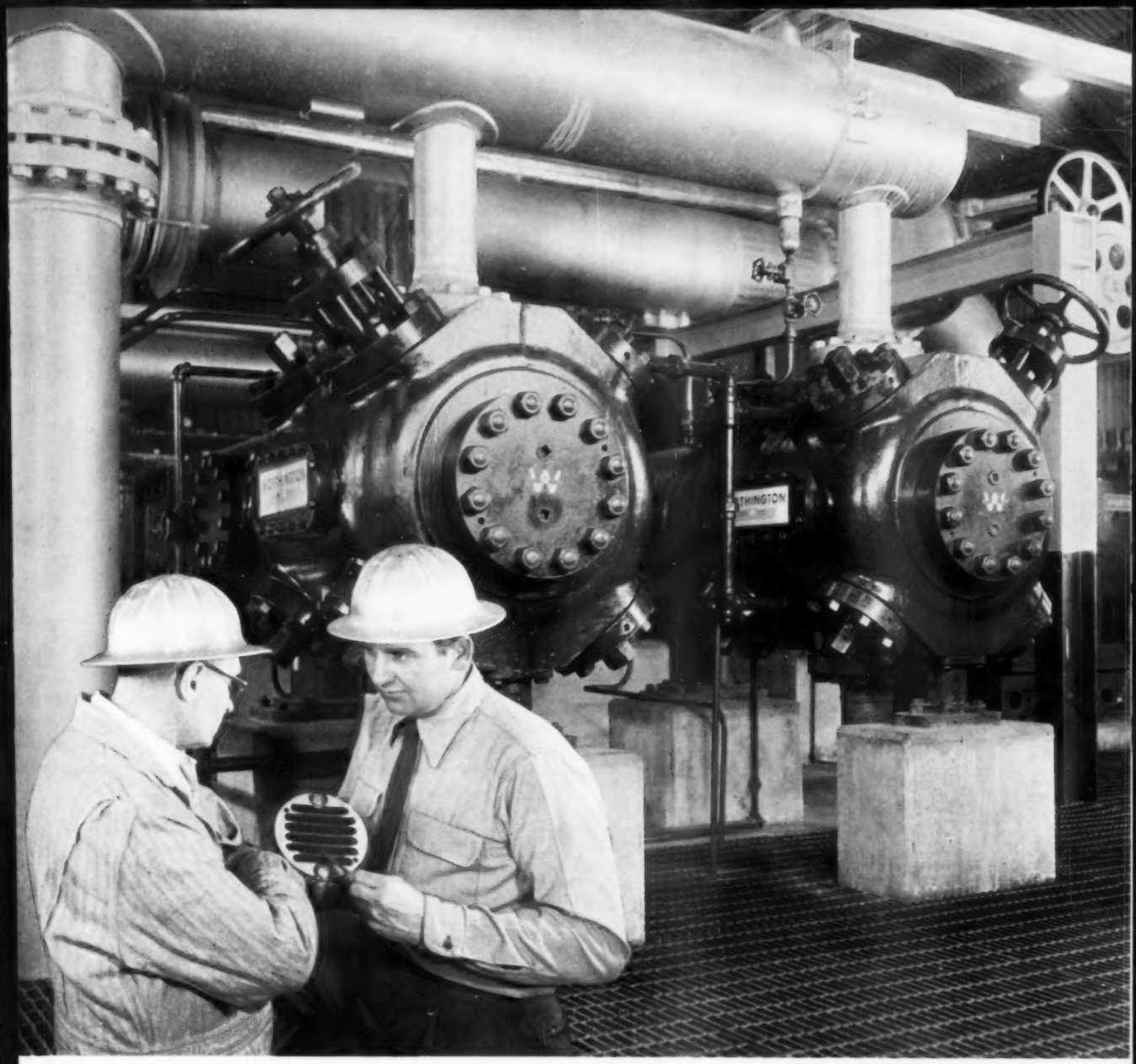
DFPA® TESTED QUALITY

Letters DFPA on panel back or edge attest manufacture and inspection under industry-wide quality control program. Individual grade-trademarks are specification guides to the right type and grade and the *right* quality.

FOR INFORMATION about specific plywood uses, or for basic specification-use data, write (USA only) Douglas Fir Plywood Association, Dept. 180, Tacoma 2, Washington.

For more facts circle 596 on Reply Card

For more facts circle 597 on Reply Card →



compressor-user survey shows

FEATHER VALVE PREFERRED 2 TO 1!

FEATHER VALVE

VALVE A

VALVE B

A recent survey of compressor users put the amazing Feather*Valve first by far in all four operating categories —simplicity of construction, efficiency, low maintenance cost and quiet operation. In addition, the Feather Valve was picked as the preferred compressor valve 2 to 1 over the nearest competing type of valve!

The lightest, fastest-acting valve available, the amazing Feather Valve provides very sharp action with virtually no slip or back-flow. It works with no impact . . . has no buffer plates or cushioning devices. Practically indestructible it assures long life with negligible maintenance costs. When buying your next compressor, look into Worthington's complete line of Feather Valve units. Worthington Corporation, Harrison, N. J.

*REG. U. S. PAT. OFF.

WORTHINGTON

NO COMPROMISES

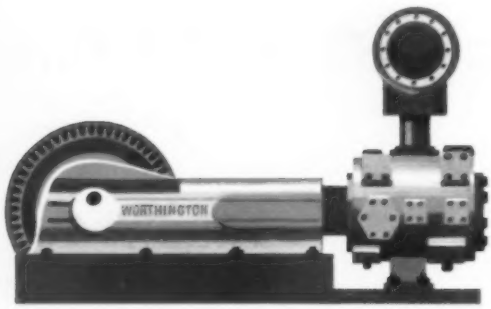
when you select from Worthington's complete compressor line

The Worthington line includes a compressor and drive for *every* compression job. Sizes range up to 10,000 hp and gas pressures to 35,000 psi. In addition to the types shown below, Worthington builds many others including steam engine, steam turbine, and engine driven machines in many types and sizes. For more information write specifying the bulletin noted below to Worthington Corporation, Section 36.1, Harrison, N. J. In Canada: Worthington Canada Ltd., Brantford, Ont.

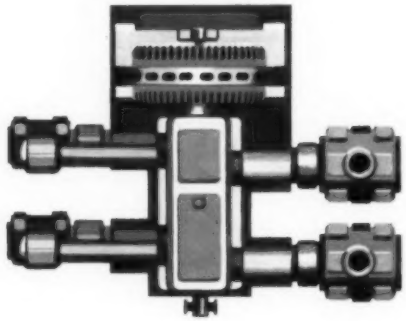
WORTHINGTON

Single horizontal compressor, type HB
5 to 150 hp—Bulletin L-640-B1E

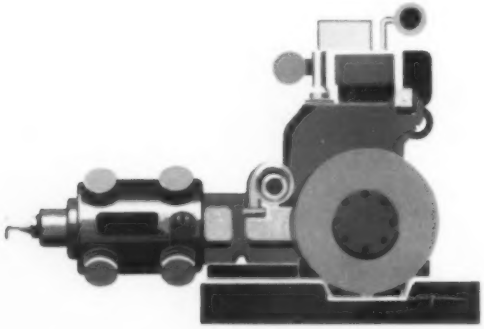
Vertical angle compressor, type YC & DYC
75 to 500 hp—Bulletin L-676-B1A



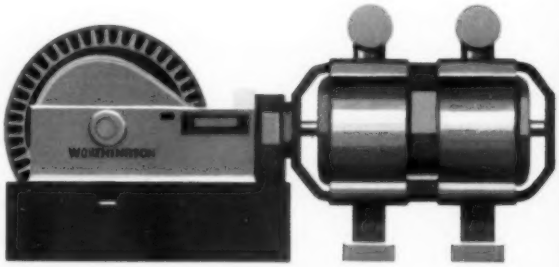
Horizontal duplex compressor, type DC
250 to 3,000 hp—Bulletin L-675-B1C



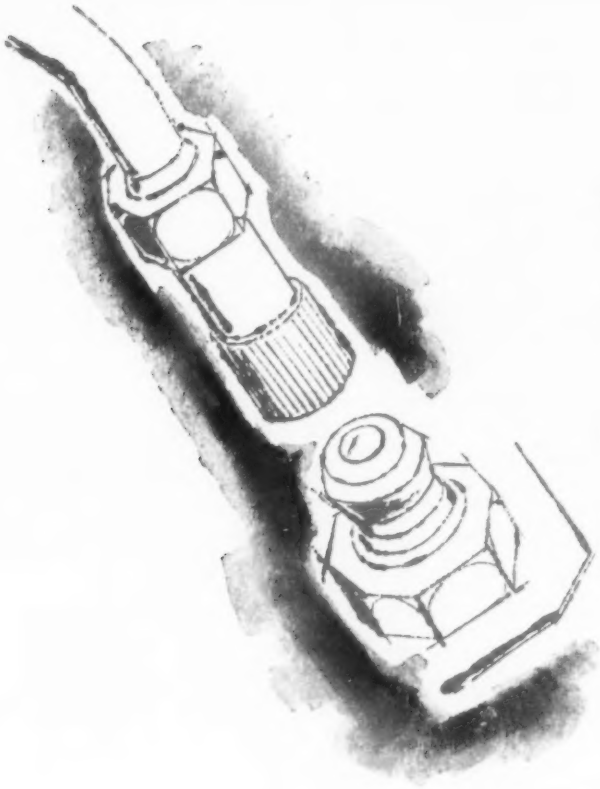
Balanced opposed compressor, type BDC
400 to 10,000 hp—Bulletin L-679-B1A



Angle gas-engine compressors, types SLHC and SUTC
375 to 2,500 hp—Bulletin S-550-B27; S-550-B23D



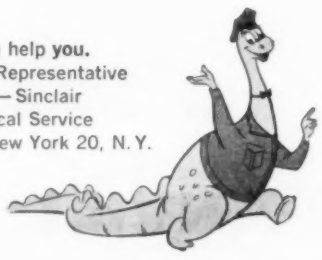
Vacuum pump, 200 to 150,000 CFM—Bulletin L-600-B9-4



Machinery... lubrication... and how to save money

Sinclair Litholine® multi-purpose grease gives many important advantages over ordinary industrial lubricants. For example, it eliminates the need for a variety of single-use greases. Furthermore, it has earned a reputation for water resistance and high temperature performance. Change to Litholine, now. And when management asks how you've cut costs, tell them you've switched to Sinclair—and show them the results.

Find out how Litholine can help you. Call your nearest Sinclair Representative or write for free literature—Sinclair Refining Company, Technical Service Division, 600 Fifth Ave., New York 20, N.Y. There's no obligation.



SINCLAIR
Litholine®
Multi-Purpose Grease

For more facts circle 598 on Reply Card

How a Johns-Manville Roof Survey helps . . .

STOP COSTLY ROOFING TROUBLES

Don't take your roof for granted, even though it doesn't seem to be leaking. Winter weather often opens up laps in the roofing, cracks the parapet and coping. Ice and snow can wear and weaken roofing felts and flashings.

To correct roofing defects before they result in costly damage, it pays to have your roof inspected every spring by an expert. Your J-M Roofing Contractor is the man to do it. He will make a complete survey covering all critical areas of the roof. This includes flashings, deck, roofing felts, parapet walls, skylights, ventilators, etc.

This detailed survey is made without obligation. A written report will tell you what defects need immediate attention. This report also points out conditions which should be corrected now to eliminate future trouble.

For free Roof Survey, call your J-M Roofing Contractor. He is listed in the Classified Telephone Directory.

Send today for a copy of booklet "Things You Should Know About Your Roof." It contains information about the J-M Roof Survey Plan. Write: Johns-Manville, Box 158, New York 16, N. Y. In Canada, write 565 Lakeshore Road East, Port Credit, Ont.

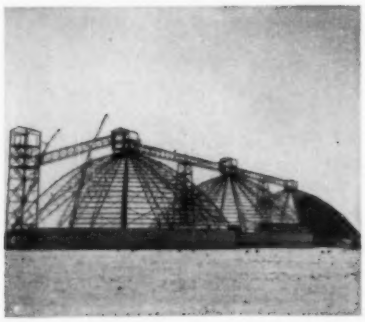
JOHNS-MANVILLE

JOHNS-MANVILLE PRODUCTS

For more facts circle 599 on Reply Card

Steel Spiderweb

fabricated and erected by American Bridge



This project consists of 3 muriate storage buildings, 1 horizontal gallery, 2 intermediate support towers for horizontal gallery, 1 included conveyor gallery, and 1 junction tower.

This dome-shaped steel framework is part of a new product storage and reclaiming area recently built for the National Potash Company at Carlsbad, New Mexico. American Bridge, which fabricated and erected the entire structural framework for this important construction, used 505 tons of structural steel. Field connections were riveted, welded or bolted with high strength and ordinary bolts.

Each of the muriate storage domes is 185 feet across at the base. From the top of the foundation wall to the top of each dome is 69 feet. The foundation wall is 16 feet high. The crown ring which provides top anchorage for arched trusses is 83′ 8½″ above the finished floor of the building. There are sixteen panels in the roof structure of each building.

American Bridge has the experience, facilities and manpower to handle all types of structural steel jobs—conventional or complicated. Whatever your next building project, call American Bridge. Put our knowledge in structural steel construction to work for you.

Owner: National Potash Company

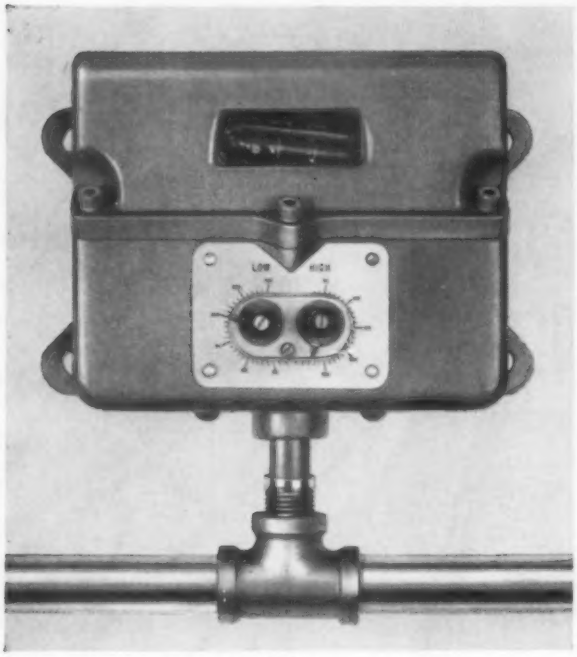
Designed by: Stearns-Roger Mfg. Co., Denver, Colorado and American Bridge Division

USS is a registered trademark

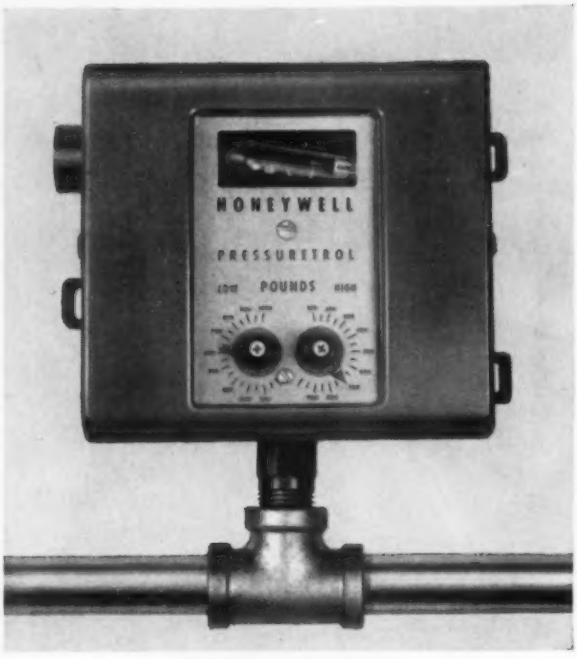
American Bridge Division of USS United States Steel

General Offices: 525 William Penn Place, Pittsburgh, Pa. Contracting Offices in: Ambridge · Atlanta · Baltimore · Birmingham · Boston · Chicago Cincinnati · Cleveland · Dallas · Denver · Detroit · Elmira · Gary · Houston · Los Angeles · Memphis · Minneapolis · New York · Orange, Texas Philadelphia · Pittsburgh · Portland, Ore. · Roanoke · St. Louis · San Francisco · Trenton · United States Steel Export Company, New York

For more facts circle 600 on Reply Card



Explosion-Proof *Pressuretrol*



Pipe-Mounted *Pressuretrol*

Here's the pressure switch you asked for... the

NEW HONEYWELL PRESSURETROL*

The rugged new P428 Pressuretrol is designed specifically for industrial use. Use it for gas or liquids at pressures to 3000 psi. Use it as a controller or as a high or low limit device. Its outstanding features are:

- **Convenient adjustment**—With set point and differential knobs located on the front of the case for maximum visibility and accessibility.
- **Visible switch position**—Window in front of case reveals at a glance whether mercury switch is made or broken.
- **Bourdon tube actuation**—Tube of beryllium copper or stainless steel depending on range.
- **Rugged, attractive case**—Made of drawn steel with die-cast cover, case resists dust, weather, corrosion. Harmonizes well with other instruments when panel mounted.
- **Explosion-proof model**—Enclosed in its own integral case with external settings—not necessary to open case or break electrical connection. It is small and compact, and requires no special housing or setting extensions . . . provides positive protection when used with hazardous gases or in hazardous atmospheres.

Panel-Mounted *Pressuretrol*

For complete details, call your Honeywell field engineer. He's as near as your phone.

MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Pa.

**Trademark, Minneapolis-Honeywell Regulator Co.*

Honeywell

First in Control

NEW *Air-Loc* WEDGMOUNT

gives you an unusual (yes, even exclusive) combination of advantages —

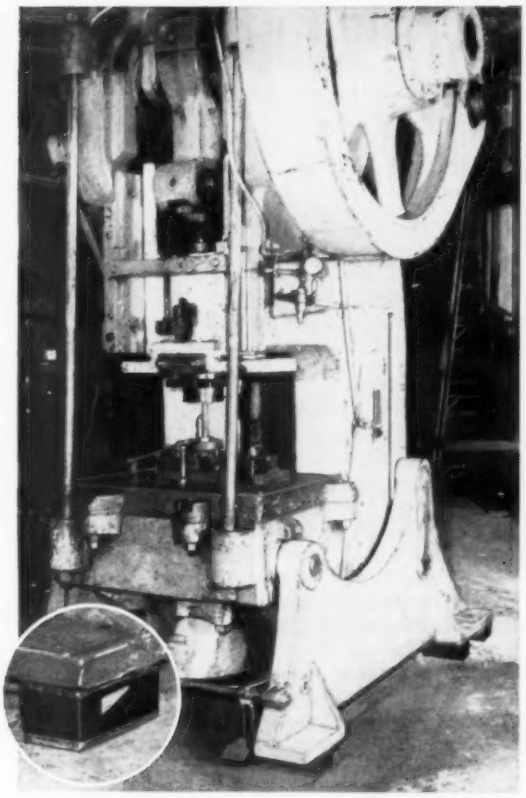
1. Double-wedge construction permits immediate and precision leveling of machines.
2. Patented Air-Loc on top and bottom of mount grips machines to floors, even when floors are oily.
3. Transmitted motion of machines on Air-Loc WEDGMOUNTS is practically eliminated.

AIR-LOC WEDGMOUNTS are guaranteed to (1) reduce transmitted machine vibration and noise, (2) permit rapid precision leveling, (3) hold your machine tools in place without bolts or cement. Replacement or a refund will be made if WEDGMOUNTS do not perform as advertised.

4 SIZES OF AIR-LOC WEDGMOUNTS
for all machine tools

2" x 4" 3" x 6" 4" x 8" 8" x 8"

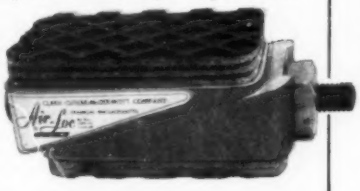
WEDGMOUNTS will support up to 1,000 lbs., 2,000 lbs., 4,000 lbs. and 12,000 lbs. respectively. Larger sizes made to order. 100% contact of both wedge surfaces assures stability.



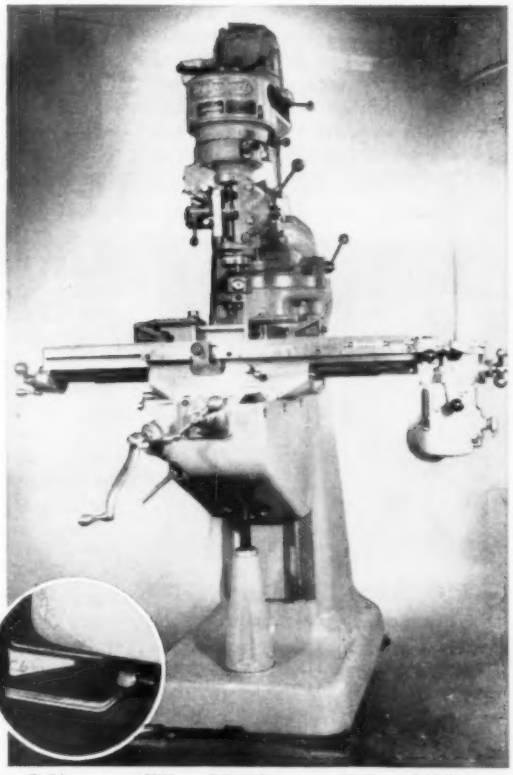
This 23,000-lb. Bliss Press on *Air-Loc* WEDGMOUNTS stays level shift after shift, and can be moved in record time if necessary.

TO USERS OF AIR-LOC

This vinyl, sisal and cork mounting pad successfully resists oils and alkalis. We recommend that you use the new WEDGMOUNT when quick precision leveling is important to you. *Air-Loc* mounting pads will remain available as the most economical method for installing machines.



WEDGMOUNT shown in lowered position



Bridgeport Milling Machine on *Air-Loc* WEDGMOUNTS was precisely leveled in ten minutes.

ASK FOR PRICES of the new AIR-LOC WEDGMOUNT and you'll be pleasantly surprised

Just write on your company letterhead or return this coupon and we will send you complete information.

AIR-LOC DIVISION, Clark-Cutler-McDermott Company
115 W. Central Street • Franklin, Mass.

☐ *Please send complete information and prices for the new Air-Loc WEDGMOUNT.*

☐ *Please send information about sheets of patented Air-Loc.*

NAME _____
(PLEASE PRINT)
TITLE _____
COMPANY _____
ADDRESS _____
CITY _____ ZONE STATE

For more facts circle 602 on Reply Card

NEW PRODUCTS AND PROCESSES summarized for your convenience

Edited by M. E. Heniken

More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 221-222.

1—COATINGS enable roof repair in any weather

Repair and recoating of roofs, even during a driving rainstorm or while roof is wet or covered with melting snow is claimed possible with Liquid Damp-Dek and Plastic Damp-Dek. The former is a roof coating containing imported and domestic waterproofing oils and high absorption Canadian asbestos fibers. Asphaltic penetrating and sealing oils give Liquid Damp-Dek ability to reach through surface dampness to resaturate and revitalize ailing, leaky felts, manufacturer states.

Plastic Damp-Dek is a patching cement for wet-weather repairs on roof flashings, seams, holes, copings, gutters and eave-spouts. It has the same characteristics as Liquid Damp-Dek but is heavier in body and compounded in paste consistency so it can be applied by trowel. Greater quantities of asbestos fiber are contained in its formulation and pine oils added to provide long service. The Monroe Co., Inc.

3—RUGGED LADDER resists weather and chemicals

Specifically designed for use in telephone maintenance, power and electrical work, this ladder is made by a process in which Fiberglas reinforced plastic is moulded over a

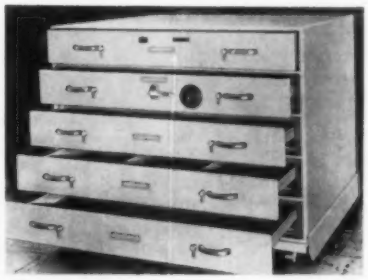
balsa wood core. This is claimed to produce the toughest, most durable of ladders. Experiments to test nonconductivity of ladder are reported to indicate no breakdown with 120,000 v applied between the rungs and 2900 v to rungs themselves. A safety feature is the non-slip, grit embedded Neoprene-covered rungs which resist chemical action. The rungs will not twist because they are plastic welded to side rails, company says, and a 650 lb force is necessary to pull them away from side rail. Putnam Rolling Ladder Co.

4—FLANGE MOUNTED DRIVE bolts to driven machine

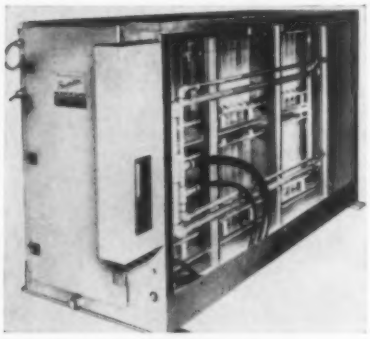
This compact gear drive bolts directly to the driven machine. The unit is designed with bearing capacities for overhung and thrust loads to allow installation into the driven machine as a geared pillow block, if desired. Thus, states manufacturer, you can eliminate one bearing and cut down the overall size of the installation. These drives are available for horizontal or vertical applications, with high speed shaft up or down. They are furnished from stock in single reduction for applications of ½ to 10 hp and in two double reduction ratios for ½ to 5 hp. Bulletin 7140 contains information. The Falk Corp.

5—DRAWING FILE is fireproof and burglar-proof

Valuable drawings can be protected from fire and theft in this file, it is stated. Drawings as large as 31-by-42 in. can be protected. The unit



has a key lock at the handle and a drill proof steel plate located ahead of all locking mechanism. Also available are a combination lock or a manipulation proof combination lock. Unit weighs approximately 1500 lb, is supplied with removable casters. Charles Bruning Co., Inc.



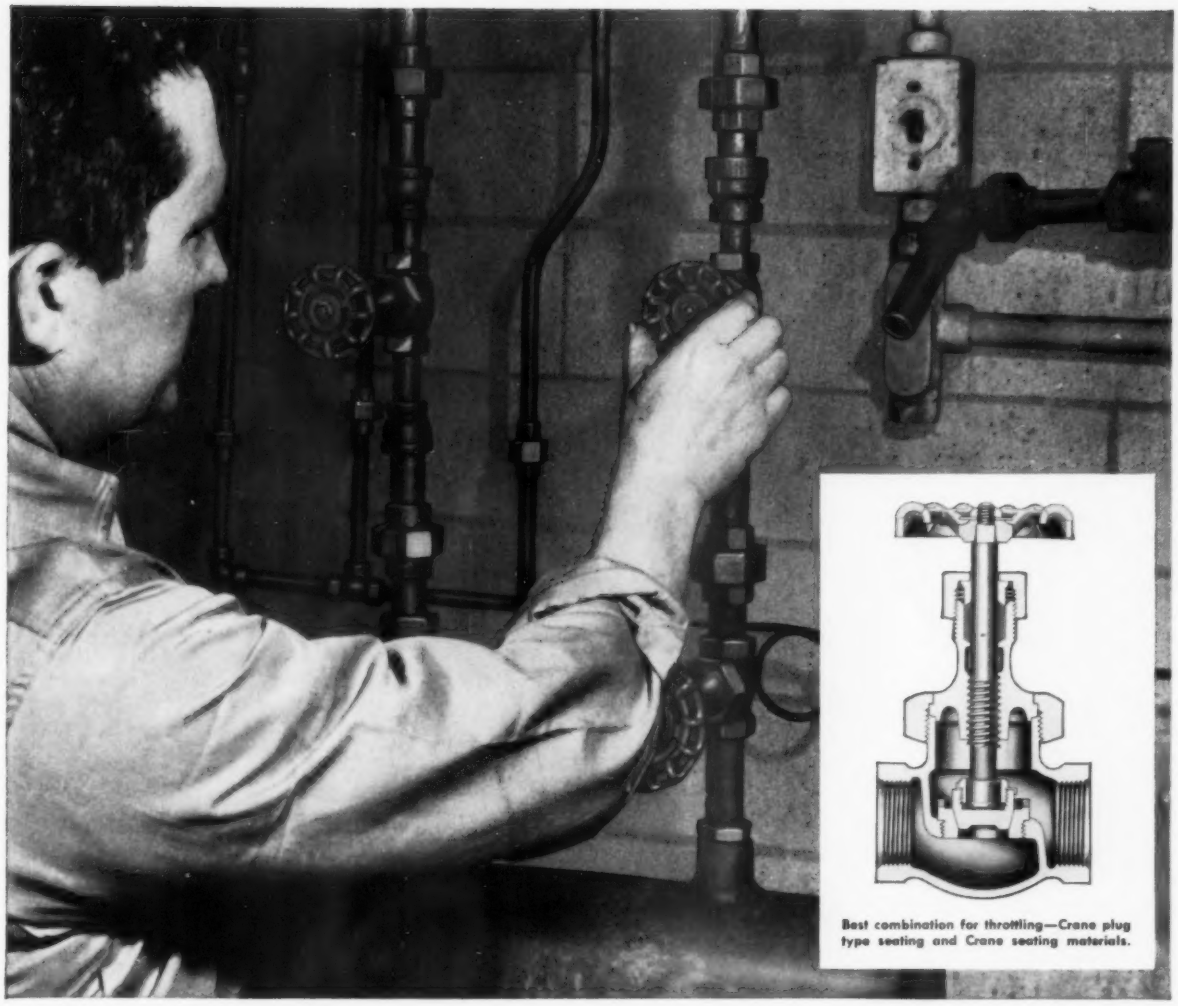
2—AIR CLEANERS feature automatic operation

Model PG Precipitrons are electronic air cleaners with fully automatic operation available in sizes for requirements from 1920 to 28,800 cfm. Washing and adhesive application is automatic. In operation, a motorized traverse washer flushes out collected dirt from the metal collector plates and sprays on a new coating of cold water adhesive. A push-button sequencing controller performs entire cycle of stopping fan, completing washing cycle and returning system to normal. For fully automatic maintenance, an optional clock control is available which operates sequencing controller on a predetermined schedule for washing at regular intervals.

The new units incorporate major advantages of manually operated Models PA and PF, it is announced —high capacity with low over-all space requirements and high air cleaning efficiency. The new Model PG Preciptrons are packaged-type units matching dimensions of company's air-distributing units, coils and accessories are designed for easy in-line installation. Sturtevant Div., Westinghouse Electric Corp.

6—ALUMINUM COATING protects against rust

Metalcoat-A is described as an aluminum pigmented liquid coating, loaded with rust inhibitors and offering long term protection against rust and corrosion under severe exposures. It can be applied to rough or polished surfaces and the surfaces need not be entirely rust free. It is claimed unaffected by temperature changes. In consistency, Metalcoat-A is similar to heavily



Best combination for throttling—Crane plug type seating and Crane seating materials.

Surprising savings for this power plant with Crane bronze throttling valves

At least once a year, this power plant of a leading machine tool builder was replacing the valves in the ½-inch continuous blowdown lines on its 60,000-pound boiler.

They were high-priced valves, but they couldn't take the continual throttling service. The seats cut out rapidly . . . blowdown regulation was lost . . . valve costs kept rising.

Thirty-one months ago this plant replaced the short-lived valves with Crane No. 212P, 200-pound bronze globe valves with plug type disc. Most of the time these Crane valves have been operating at less than half-open.

Yet, at every inspection to date, they've been found O.K.—no seat damage . . . no loss of regulation . . . no maintenance needed. Another proof of the economy of Crane quality!

To cut your valve and piping maintenance costs—on steam or any fluid—call in your local Crane Man. He has more to offer in money-saving piping materials.

COST-SAVING IDEAS FOR YOU in this free 36-page book of "Valve Performance Facts." Get your copy from your Crane Man or write to address below.

CRANE VALVES & FITTINGS

PIPE • PLUMBING • KITCHENS • HEATING • AIR CONDITIONING

Since 1855—Crane Co., General Offices: Chicago 5, Ill. Branches and Wholesalers Serving All Areas

For more facts circle 603 on Reply Card

NEW PRODUCTS

(Begins on page 176)

pigmented aluminum paint and can be applied by brush, roller, spray or dipping. A gallon covers 250 to 300 sq ft; two coats are recommended. Suggested applications include piping, fences, storage tanks, metal roofs, stacks, fabricated steel or machine parts. Gulf Oil Corp.

7—MOTOR COMPRESSORS available up to 15 hp

These motor compressors are announced as suction gas cooled to assure greater durability and longer life to vital motor windings. Bolted construction permits easy take-down for servicing, company says, and speedy removal of valve plates for inspection. The units are of compact design and light weight, and has dynamic and static balancing for quiet performance. Units are available for use with refrigerant 22 in 2- to 15-hp models, with refrigerant 12 from 1½ hp to 7½ hp. Dunham-Bush, Inc.

8—COUNTER serves as shelving, area divider

These multi-purpose steel cabinets serve as shelf storage area partition and counter-tops. They come in two-tone combinations of 12 basic colors. Each consists of a counter-height cabinet with storage shelves covered with a suitable counter-top material. Units are part of a system

for continuous runs of almost any length and rectangular configuration. Units can be bolted together, taken apart and re-used in different combinations. Basic cabinet is 36 in. wide, 12 in. deep and has two shelves adjustable on 2-in. centers. Sliding doors provide access to storage from one side. Continuous counter topping, 15 in. deep, brings height of unit to 40 in. Counter surfaces are linoleum or plastic. Standard Pressed Steel Co.

9—IMPROVED HANDLING SYSTEM for the big waste loads

Detachable containers, up to and over 40 cu-yd capacity, are used in this system of handling based on the Dempster-Dinosaur. Basic advantages are: larger capacity containers, better weight distribution; hydraulic operation without the use of winches, sheaves, telescopic cylinders, cables or chains; pick-up and handling operations performed without driver leaving the truck cab, ability to put containers on and off docks. Components of the Dempster-Dinosaur are a tilting frame, two hydraulic raising and lowering cylinders and a double-acting bail cylinder, which pulls containers up the tilting frame with a ratcheting action. Over-the-road models now available handle 22,000 lb and 30,000 lb. Off-the-road models will be available with hoisting capacities limited only by truck's load capacity.

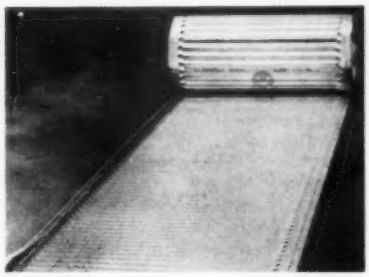
Primary use of the Dempster-Dinosaur will be for large accumulations of waste materials in metal working, chemical, petroleum, food, paper and similar plants. Trash, rubbish, dunnage, ash, machine trimmings and salvable scrap are among materials that will be handled. Photos show a truck-mounted Dempster-Dinosaur backing up to a loaded container (top); the container being pulled up onto the tilting frame (center); and the container locked in carrying position, ready to travel. A brochure gives details. Dempster Brothers, Inc.

10—STARTER is easier to install, and safer too

To provide simplified installation and increased safety for personnel, this company has incorporated new design features into its Limitamp, a medium-voltage starter. Key additions are a new motor cable raceway and plug-in contactor control leads. Also included is a heavy-duty interlock and new door latch and handle. The fused starter provides coordinated control of motors up to 3000 hp on systems with 150,000 kva available at 2300 v and 250,000 kva available at 4000 or 4800 v. The starter employs a 50,000 kva interrupting capacity contactor. According to company engineers, the use of plug-in control leads instead of conventional terminal boards will simplify installation and assure proper connections. Addition of the new motor cable raceway has been made at no increase in price, it is noted. The 4-by-6 in. phenolic tube extending from panel roof to current transformer, is designed to make possible safer cable pulling even when the starter is energized. General Electric Co.

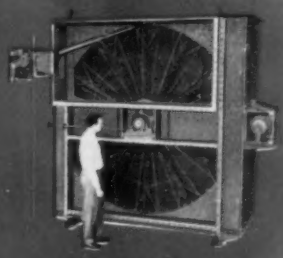
11—ROLL ROOFING is now easier to nail down

Two major improvements in Cecoroll, a galvanized corrugated roll roofing, facilitate nailing down correctly and promote tight sealing. Cecoroll comes in 31-ft rolls and can be laid down by one or two men rolling it across the roof purlins like



a rug. The nailing edge is crimped, instead of corrugated, for easier application. A sealing mastic is factory applied to the lap edge. One of the two new design improvements is a scored line impressed into the crimped side. This scoring runs the length of the roll. It serves as a nailing guide and, once nailed down,

Here's what you can do about the high cost of fuel.



Get the same heat from cheaper fuel with a

LJUNGSTROM® PACKAGE AIR PREHEATER

You can get standard operating temperatures from the cheaper fuels if combustion temperature is high enough. Peat, bagasse or even wood can be used successfully. The Ljungstrom Air Preheater can increase combustion temperature by as much as 300° by recovering heat from the exhaust gas. This reclaimed heat would otherwise go up the stack. All it costs is the price of the preheater—and the Ljungstrom can save enough on fuel to pay for itself in approximately two years.

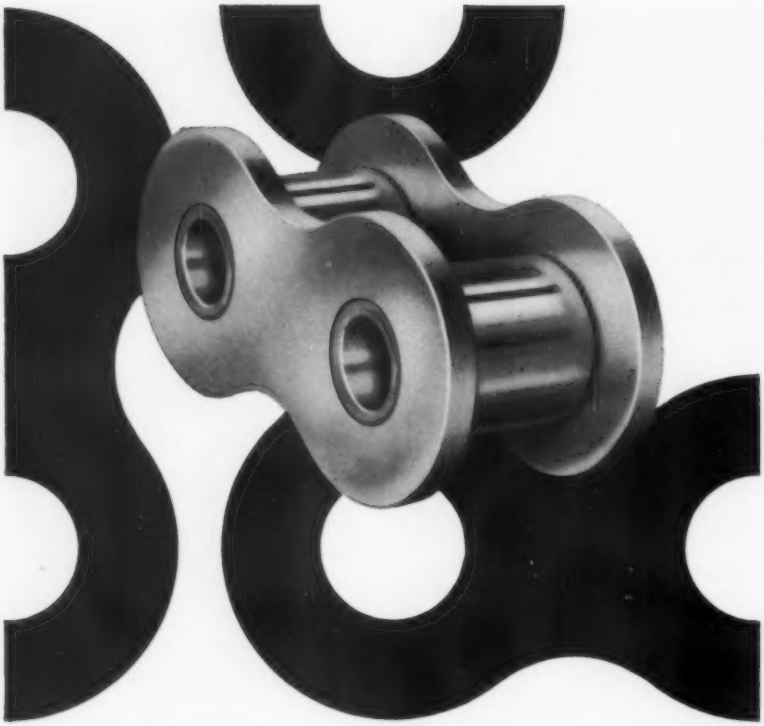
You can be sure of maximum heat recovery because the Ljungstrom's exclusive rotary heat transfer element picks up the heat from the exhaust and puts it back into the combustion air without passing it through partitions or tube walls. Package design gives you all the advantages and economies of the Ljungstrom in a compact, preassembled unit. The Package Ljungstrom is available in vertical or horizontal models that are readily adaptable to any plant arrangement.

For further information, write today for the free 14-page Package Ljungstrom manual.

THE AIR PREHEATER CORPORATION

60 East 42nd Street, New York 17, N. Y.

For more facts circle 604 on Reply Card



GET MORE ENGINEERED EXTRAS

WHITNEY PROCESSED CHAIN FOR BETTER DRIVE DESIGN LONGER SERVICE LIFE

Whitney's *fatigue-resistant* Processed Roller Chain Drives are setting new service records in every field. Important Whitney developments now supply *increased endurance, greater dynamic strength* for the toughest problem drives . . . for special power transmission and conveying requirements.

These developments include:

- **Patented process which imparts beneficial stresses to critical internal surfaces of chain rollers for greater fatigue life. This roller treatment is possible only through the Whitney process.**
- **Unique compressive technique applied to heat treated alloy steel chain links builds in concentrated residual stresses in the pitch hole area for greater dynamic strength.**
- **Shotpeening of components raise endurance limits to accept higher loadings imposed by modern drive demands.**

Your Whitney Factory or Field Service Engineer will gladly explain how these quality cost-saving features can be selectively applied to your present equipment or drive design for maximum performance.

And Whitney's complete line of standard, finished steel chain drives insure adaptability to the widest range of power transmission and conveying requirements. Available through field warehouses and nationwide distributor service. Write for helpful, practical catalog literature.

Heard About Whitney-Tormag Magnetic Drives?

For complete motor overload protection, cushioned starts and high efficiency, ask about our new permanent magnet, self-contained power transfer units. Available in 1, 2, 3 and 5 H.P. units as stock items, additional sizes up to 15 H.P. will follow . . . Write for new 8 page Technical Bulletin. Box 318F-TOR

Whitney

• CHAIN COMPANY

318F HAMILTON STREET • HARTFORD 2, CONNECTICUT

ROLLER CHAIN • CONVEYOR CHAIN • SPROCKETS • FLEXIBLE COUPLINGS • WHITNEY-TORMAG DRIVES

For more facts circle 605 on Reply Card

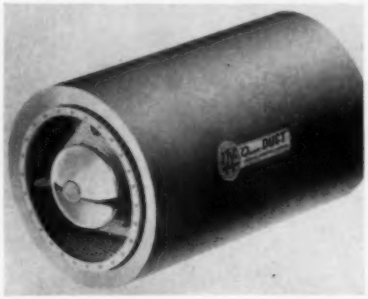
NEW PRODUCTS

(Begins on page 176)

the scoring presses into the sealing mastic on the lap edge of the roofing beneath. The other improvement is a continuous red gage line printed on each roll, telling the user to: "Cover this gage line—Cecoroll must lap 1½ in." This helps to assure that proper lap will be maintained. Ceco Steel Products Corp.

12—DUCT SILENCER installs in round duct systems

The Quiet-Duct Conic-Flow Silencer makes possible easier installation in round duct systems in that the circular shape eliminates need for transition sections. Made in diameters from 6 to 60 in., and in



length from 4 to 10 ft, these silencers are designed to meet air flow specifications from 100 to 100,000 cfm for any desired attenuation. They are also available in sizes to match inlet and outlet connections of axial flow fans. The Twin-Conic design provides less turbulent flow, company says, with less regenerated noise, resulting in maximum attenuation with lowest pressure drop. Also, the circular shape is said to enable applications with pressures to 100 in. water gage. Industrial Acoustics Co., Inc.

13—POWER SWEEPER with improved dust control

Outstanding among features of the 705 and 706 Power Sweepers is the Filter-Vac dust control system which eliminates the emptying of a dust bag when cleaning the filter system. In the new models, dust laden air passes through a series of filter sleeves and deposits dust directly into the hopper. According to company, this system provides a 300 per cent greater filtering area over previous models. Dumping the hopper is a simple operation accomplished by merely hydraulically raising the rear hopper. Other en-

Ultimately, *somebody* has to get rid of "plant" dust, dirt, smoke and fumes. If the job is left up to workers, the cost to management is exorbitant. For example, if workers' cars are constantly exposed to blankets of dust in the Company parking lot, lowered morale and complaints are the inevitable result.

The modern (and thrifty) way to attack the problem is with AAF Dust Control applied at all dust sources. This way, dust is trapped the instant it is produced. It never has a chance to irritate workers, arouse neighborhood housewives or run up your own plant cleaning costs.

For complete information on AAF's complete line of dust control equipment, write for "The Answers to the Five Basic Dust Problems" (Bulletin 270-A1). Address: Mr. Robert Moore, American Air Filter Co., Inc., 228 Central Ave., Louisville 8, Ky. In Canada: American Air Filter of Canada, Ltd., 400 Stinson Blvd., Montreal 9.

AAF **American Air Filter**
COMPANY, INC., LOUISVILLE, KENTUCKY

For more facts circle 606 on Reply Card

NEW PRODUCTS

(Begins on page 176)

gineering advances include a large dirt hopper capacity, automotive type steering, full all-round vision, heavy steel wrap-around bumpers and quick broom change assembly. Model 705 has a main sweeping swath of 36 in.; Model 706, reportedly the largest of industrial sweepers, has a main sweeping swath of 48 in. Wayne Mfg. Co.

14—A-C BRAKE features "unitized" construction

This a-c brake is announced as UL approved for both Class I Group D and Class 2 Groups E, F and G, and designed specifically for mounting on NEMA "C" mounting flange

of fractional horsepower electric motor frames 56-C and 66-C, integral motor frames 182 and 184. A-c voltages 110 through 550; 25, 50 or 60 cycles, including dual voltages, are available. The unit offers "unitized" construction of operating mechanism, simplicity of design, single solenoid, external manual release-automatic reset and visual indication of necessity for adjustment for lining wear. Sheet 3602 gives data. Stearns Electric Crop.

15—ANTI-RUST PAINT applies over damp metal surfaces

Apex Black contains a penetrating vehicle, company says, which enables paint to cut through moisture and adhere to the surface metal. It is designed to absorb rust particles into the paint pigment, retarding further rust action and forming a glossy black finish. The paint will resist dampness, grease, oil, and mild industrial acids, it is claimed, and will withstand extreme temperature changes and retard corrosion due to salt water and salt-laden air. Manufacturer recommends it for use on exterior and interior metal surfaces, including cross beams, pipes, ventilators, gutters and downspouts. Paramount Industrial Products Co.

16—CASTERS designed to absorb shocks

Of drop-forged steel construction, Cush-N-Aire Casters are shock absorbing for handling liquids, delicate assemblies and other fragile loads. They are equipped with pneumatic tires in 8- to 16-in. sizes. Casings are four-ply with separate inner-tubes. Bolted hubs permit on-the-job demounting of tires. Load capacities range to 1000 lb per caster. Construction features include integrally forged kingpin, Timken tapered thrust bearing and slotted cotter pin for adjustment of swiveling action. A four-position lock is optional. Bulletin 129 gives details. The Hamilton Caster & Mfg. Co.

17—PENCIL for drafting on matte-surface film

Mar-Lumograph Duralar Pencils are for use with the new matte-surface Mylar tracing film. Duralar lead is smearproof on this film, says manufacturer, yet erases perfectly. Tracings can be soap-and-water cleaned without loss of clarity, it is announced, and tracings can be printed over and over without loss of detail. Reproductions of Duralar tracings on Mylar are claimed equivalent in quality to prints made from India ink tracings, which require more drafting time. There are five degree designations ranging from soft to hard. J. S. Staedtler, Inc.

18—FLOODLIGHTS are low-cost, general purpose units

An addition to company's MUA floodlight series, Model III is a general purpose floodlight which takes all Alzak aluminum and procelain

reflectors used on other MUA models. Combined with its two bracket arms and three bases, Model III provides a choice of seven mountings. The floodlights may be mounted on pipe or on horizontal or vertical surfaces, and are available in open and closed types. Various models

G-B SNAP*ON DISTRIBUTORS

(See ad on facing page)

ALBUQUERQUE, Mt. States Insulation Co.
AMARILLO, Ball Distributing & Engr. Co.
ATLANTA, Ga., Reynolds Aluminum Supply Co.
BALTIMORE, Md., Leroy Insulation Co.
BILLINGS, Mont., Big Horn Supply, Inc.
BIRMINGHAM, Ala., Shook & Fletcher Supply
Reynolds Aluminum Supply Co.
BOSTON, Homans-Kohler, Inc.
BUFFALO, Industrial Insulation Sales, Inc.
CHARLESTON, W. Va., Baldwin Asbestos Products Co.
CHARLESTON HEIGHTS, S. C., Stafford Insulation Co.
CHARLOTTE, N. C., Guy M. Beaty & Co.
CHATTANOOGA, Guy M. Beaty & Co.
CHICAGO, E. C. Carlson Co.
CINCINNATI, R. E. Kramig & Co.
CLEVELAND, The Miles Materials Co.
COLUMBUS, Santeler Brothers
DALLAS, Insulation Supply Co., Inc.
DAVENPORT, Republic Electric Co.
DENVER, Gene Wright Lumber Co.
DES MOINES, Iowa Asbestos Co.
DETROIT, Coon DeVisser Co.
EL PASO, Insulation & Specialties Co.
EVANSVILLE, Ind., George Koch Sons, Inc.
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FT. WAYNE, Ind., M. H. Hilt, Inc.
FT. WORTH, The Bracken Co.
GREENSBORO, N. C., Starr Davis Co., Inc.
GULFPORT, Miss., Paine Supply Co.
HOUSTON, Precision Insulation Co.
INDIANAPOLIS, Central Supply Co.
JACKSON, Miss., Paine Refrigeration & Supply Co.
JACKSONVILLE, Ferber Sheet Metal Works
JOPLIN, Mo., Joplin Cement Co.
KANSAS CITY, Kelley Asbestos Co.
LITTLE ROCK, Gunn Distributing Co.
LOS ANGELES, Western Fibrous Glass Products
Thorpe Insulation Co.
LOUISVILLE, General Insulation & Roofing Co.
MEMPHIS, John A. Denie's Sons Co.
MIAMI, Reynolds Aluminum Supply Co.
MILWAUKEE, F. R. Dengel Co.
MINNEAPOLIS, Asbestos Products, Inc.
MOBILE, Ala., Shook & Fletcher, Inc.
NASHVILLE, Reynolds Aluminum Supply Co.
NEWARK, N. J., Eastern Steam Specialty Co.
NEW HAVEN, Conn., Insulation Supply Co.
NEW ORLEANS, Eagle Asbestos & Packing
NEW YORK, Eastern Steam Specialty Co.
OKLAHOMA CITY, Ball Distributing & Engineering Co.
OMAHA, Cardinal Supply & Mfg. Co.
PHILADELPHIA, John F. Scanlan, Inc.
PITTSBURGH, Dravo Corp.
PHOENIX, Ariz., Kircher Asbestos & Rubber Co.
RALEIGH, N. C., Reynolds Aluminum Supply Co.
RAPID CITY, S. D., Robbins & Stearns Wholesale
RICHMOND, Va., Reynolds Aluminum Supply Co.
ROCKFORD, Ill, Mott Brothers Co.
SALT LAKE CITY, Bullough Asbestos Supply Co.
SAN ANTONIO, The Bracken Co.
SAN DIEGO, Western Fibrous Glass Products
SAN FRANCISCO, Western Fibrous Glass Products
SAVANNAH, Ga., Reynolds Aluminum Supply Co.
SEATTLE, Western Fibrous Glass Products
SOUTH BELOIT, Ill., Mott Brothers Co.
ST. PAUL, Asbestos Products, Inc.
SYRACUSE, N. Y., Industrial Supply Co.
ST. LOUIS, The Stovey Company, Inc.
SULLIVAN, Ill., Lewi David, Inc.
TAMPA, Fla., Eagle Roofing & Art Metal Works, Inc.
TALLAHASSEE, Fla., Bakers, Inc.
TULSA, Okla., Ball Distributing & Engr. Co.
TUPELO, Miss., Paine Supply Co.
WASHINGTON, Walter E. Campbell Co., Inc.
WICHITA, Jamar-Olmen Construction
VANCOUVER, B. C., Fleck Brothers Limited

For more facts circle 607 on Reply Card

TEVA*...best way to compare pipe insulations

Recently a company building a new plant asked us questions about Snap*On, the one-piece pipe insulation of fine glass fibers that simply snaps on pipe. How would 1½" thick Snap*On compare thermally with 2" of another insulation? What effect would it have on material costs? . . . on operating costs?

Our answers were contained in the following TEVA* report:

*Thermo-Economic Value Analysis

PURPOSE . . . to compare Snap*On with Insulation "A".

BASIS OF COMPARISON . . . 15,000 lin. ft. of 8" (average size) pipe
Average Pipe Temperature—350° F
Annual Operating Time—7200 hrs.
Cost of Heat—$0.50/million Btu
Heat Loss Values—Published by manufacturers

CONCLUSIONS

A. HEAT LOSS (Btu/Lin. Ft./Hr.)

Insulation "A", 2" thick	132
SNAP*ON Pipe Insulation, 1½" thick	98
SNAP*ON Savings (Btu/Lin. Ft./Hr.)	34

B. ANNUAL SAVINGS—$ OPERATING COSTS

15,000' x 34 Btu x 7200 Hrs. = 3,672,000,000 Btu
$0.50 (per million Btu) x 3.672 = Annual Saving of..... **$1,836**

C. INITIAL SAVINGS—MATERIAL COST

2" Insulation "A", 15,000 lin. ft. @ $2.08	$31,200
1½" SNAP*ON, 15,000 lin. ft. @ 1.404	21,060
MATERIAL COST SAVINGS WITH SNAP*ON	**$10,140**

***TEVA (THERMO-ECONOMIC VALUE ANALYSIS) IS AN EXCLUSIVE G-B SERVICE. NO OBLIGATION — JUST CALL YOUR LOCAL G-B DISTRIBUTOR**
(LISTED IN ADJOINING COLUMN)

GUSTIN-BACON *Manufacturing Company* GUSTIN gb BACON

Thermal and acoustical glass fiber insulations • Pipe couplings and fittings • Molded glass fiber pipe insulation

244 W. 10th ST., KANSAS CITY, MO.

At exceptionally low cost you can mechanize your material handling with this one basic unit and easily changed attachments.

ONE multiple-tool Moto-Bug does ALL these jobs

HOPPER BODY — As a power wheelbarrow, Kwik-Mix S-10 Moto-Bug carries up to 1500 lbs. of bulk materials in big, 10 cu. ft. gravity-dump hopper. Snub-line controls rate of discharge. The S-10 climbs 16% ramps or grades fully loaded. It turns in 61-in. radius, clears 33-in. aisles, doorways, works inside warehouses, box cars, elevators, cargo planes. (15 cu. ft. hopper body optional.)

PLATFORM — Change from hopper body to 32-inch x 4-foot platform, and you have a heavy-duty, ¾-ton truck. Flat-bed platform tilts for easy pull-away when unloading. Sturdy all-welded steel bed is rib-reinforced — and has stake pockets for adding sideboards. But that's not all! Kwik-Mix Moto-Bug does your lifting, stacking, loading, too. For instance —

FORK LIFT attachment on S-10 Moto-Bug has 1000-lb. capacity (at 15-inch load center), and 6-foot lifting height. Forks are 20 or 30 inches long, adjustable 6 to 32 inches wide for handling boxes, barrels, drums, crates. Hydraulic power raises, lowers load. Power-tilt mast optional.

Larger-capacity R-18 Moto-Bug with multiple attachments is also available. Exhaust fume-control unit, or L. P. gas equipment is optional on both models. Want more facts? See Kwik-Mix distributor, or write today.

MAIL TODAY

KWIK-MIX COMPANY, Port Washington, Wisconsin

Send literature on S-10 Moto-Bug with ☐ *hopper* ☐ *platform* ☐ *fork lift*

NAME ..... TITLE .....

COMPANY ..... DIV. .....

STREET .....

CITY, STATE .....

☐ *Also interested in larger multiple-tool R-18 Moto-Bug KM804 PE*

KWIK-MIX MOTO-BUG — A division of Koehring Co.

For more facts circle 608 on Reply Card

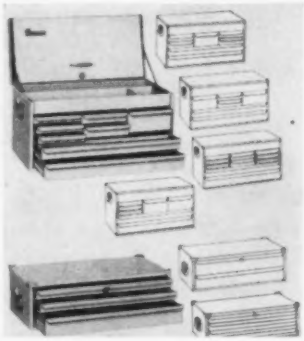
NEW PRODUCTS

(Begins on page 176)

are suitable for long, medium, and short-range floodlighting. All take 750-100-1500 w, PS-52 bulbs for general lighting. Crouse-Hinds Co.

19—TOOL STORAGE UNIT has changeable drawers

This tool chest and drawer section features changeable drawers which let you design your own tool storage unit. All deep drawers, all shallow drawers, or a combination of deep, shallow, and medium-depth



drawers can be selected. Feature changes can easily be made to accommodate changes in storage requirements. Drawers are described as non-sag, non-spill, easy running units with full width, roll-type pulls for easy opening from any angle. Overall dimensions of this tool chest are 26-by-12 by 14 in. high. Drawer section is designed to fit under tool chest. Snap-On Tools Corp.

Use the Reader Service Cards provided on pages 221-222 to ask for more information on these products. Circle item numbers of products in which you are interested.

20—GAS UNIT HEATER is compact, fan type

Available in 64,000- to 200,000-Btuh output capacities, this unit heater is announced as extremely compact in size and suited for any application requiring direct, diffused warm air in less than extreme high output capacities. Construction features include both vertical and horizontal louvers to diffuse warm air over a wide area. Heavy-duty heat exchangers are 18-gage aluminized steel tubes with 16-gage aluminized

"A drop in the bucket!" The constructions shown here by Tom Weichel, Okonite's portable cable engineer, are just a random sampling of the flexible cords and cables that Okonite has developed for industrial operations. More than likely, Okonite has available right now the exact cable you need—in terms of toughness, flexibility, capacity, resistance to oils, acids, alkalies, water, heat and abrasion. If not . . . we know how to build it!

Here's how we add value to your portable cable dollar

Behind these cable constructions are service records that prove the extra long life of Okocord flexible cords and portable cables under the most severe industrial conditions of mechanical abuse, run-overs, heat, oil, moisture, and constant dragging over cement floors.

Longer cable life means lower operating costs . . . reduction of costly work stoppages . . . greater utilization of expensive equipment. Truly, Okocord's longer life represents money in the pocket for any plant operator.

Here's how Okonite assures maximum value for your cable dollar.

1. By the use of materials developed in 80 years of making the finest cables.
2. By constant research to find even better materials and constructions.
3. By intimate, first-hand knowledge of industrial problems and conditions.
4. By self-imposed standards for manufacturing and testing that are more exacting than the industry requires.

There are Okocord quality cables for your machinery and portable equipment. There are Okonite specialists ready and willing to help you in the planning or installation stages. And there is a brand new booklet full of valuable hints on picking the right cable constructions for your all-important power or control circuits. Write for free Bulletin PE- 1117—"How to choose insulated cable"—to The Okonite Company, Passaic, New Jersey.

where there's electrical power . . . there's **OKONITE CABLE**

6238

For more facts circle 609 on Reply Card

CM *METEOR* Electric Wire Rope Hoist

½ to 5 ton capacities—Compact, enclosed design. Low headroom. Continuous hoist-duty motor with thermal overload protection for heavy duty service. Precision bearings and helical gears for long life. Only 110 volts at push button control.

CM HOISTS

FOR { REPETITIVE PRODUCTION APPLICATIONS OR RUGGED MAINTENANCE WORK

HAND or ELECTRIC—CHAIN or WIRE ROPE

CM makes them all! So you can choose a hoist that's perfectly suited to your own needs in a safe, highly efficient CM design. Three of the most popular models are illustrated. Specifications of other types and sizes on request.

CM *LODESTAR* Electric Chain Hoist

⅛ to 1 ton capacities—First truly heavy duty version of small electric hoist. ¼ ton model weighs only 51 lbs. Heavy duty self-adjusting mechanical brake and regenerative electrical braking. Overload protection and upper-lower safety switches. CM-Alloy load chain.

CM *CYCLONE* Hand Chain Hoist

¼ to 10 ton capacities—Easy to carry and lift. One ton model weighs only 36 pounds. Made of tough aluminum alloy. CM-Alloy load chain. High efficiency. Lifetime lubrication.

ALSO CM Pullers, Trolleys and Cranes

CALL the CM distributor for catalog, prices and fast delivery from stock.

CM HOISTS AND CHAIN

CHISHOLM-MOORE HOIST DIVISION

COLUMBUS McKINNON CHAIN CORPORATION

TONAWANDA, NEW YORK

REGIONAL OFFICES: NEW YORK, CHICAGO, CLEVELAND

In Canada: McKINNON COLUMBUS CHAIN LIMITED, ST. CATHARINES, ONTARIO

For more facts circle 610 on Reply Card

NEW PRODUCTS

(Begins on page 176)

steel header plates. Stainless steel ribbon burners can be removed through bottom access, and burner tray is also removable.

Standard controls include automatic pilot with safety automatic gas valve, 115-v adjustable gas pressure regulator, high limit control and manual main gas and pilot valves. Lennox Industries Inc.

21—PIPE CUTTER requires no vise or turning

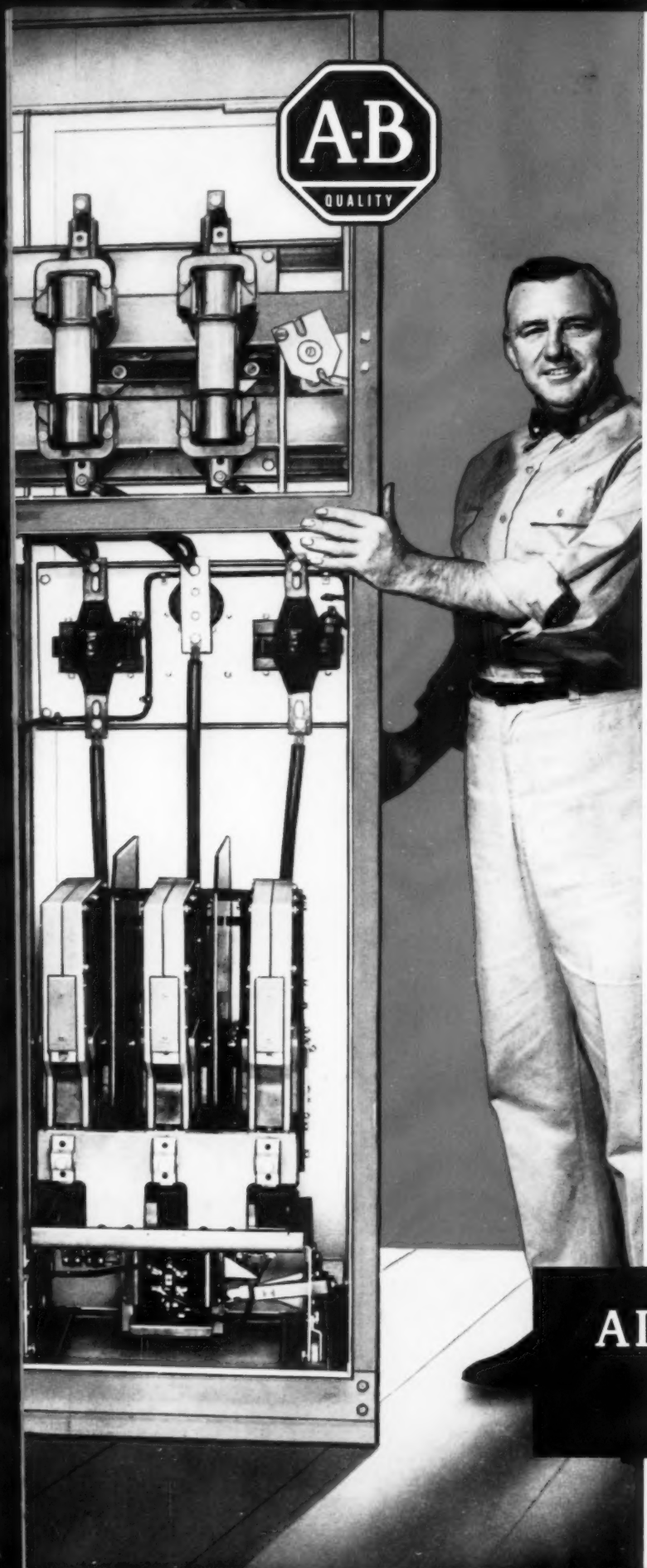
This pipe cutter is designed for standard or extra-heavy soil pipe, field tile, vitreous tile, flue lines (square or round), transite, and duriron. Pipe cutter is described as easy to use, requiring no vise or

turning. Operator wraps the chain around pipe, pulls handle, and cuts any standard or extra-heavy soil pipe or tile, 2 through 4 in. By adding an extra chain, operator can cut 6-in. extra heavy soil pipe or 15-in. tile. Once adjusted, any number of cuts can be made without further adjustment, it is noted. According to company, cutter takes 10 sec to operate, cuts cleanly without breakage, can cut slices as narrow as ¾ in., and is easy to use in close quarters. Wheeler Mfg. Co.

22—HEAT EXCHANGER for cooling and process use

Evaporation of a water spray over the cooling coils provides the cooling effect at the rate of about 1000 Btu per pound of water evaporated in this new model of the Aero Heat Exchanger series 44-H00. The air stream, in which the heat is rejected, enters near the top of one side, travels down through the spray chamber and is drawn upward through the plenum and discharged by propeller fans. The fluid is cooled to a point close to the atmospheric wet bulb temperature and the control of temperature is automatic, governed by modulating amount of air flow of fresh or recirculated air. Heat is removed at the rate of input. Special features announced in-

For more facts circle 611 on Reply Card →

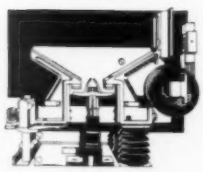


Tough high-voltage job?...Here's the answer!

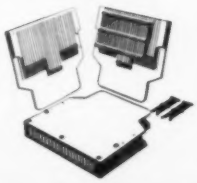
Allen-Bradley High-Voltage Air Break Starters are ideal for frequent switching, reversing, plugging, or jogging.

A tremendous operating life has been built into these high-voltage air break starters . . . resulting from the use of the simple solenoid contactor. It's the same design—having only ONE moving part—that provides millions of trouble free operations in Allen-Bradley's low-voltage controls. These starters are made in a complete line for all types of service. Send for Publication 6080, today.

ONLY ONE MOVING PART
With this simple solenoid design, all trouble causing pivots, pins, and flexible jumpers are eliminated. Straight up-and-down motion of contactor is virtually frictionless.



DOUBLE BREAK CONTACTS
Allen-Bradley silver alloy contacts never need maintenance . . . they remain in perfect operating condition until completely worn away. Vertical motion assures uniform contact pressures at all times.



FASTER ARC SUPPRESSION
The air break contactor employs a completely different blowout design and novel arc chute which assure rapid arc extinction. Chutes are molded from arc resistant material.

ALLEN-BRADLEY
MOTOR CONTROL
QUALITY

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

9-58-M

THE ONLY LINE OF

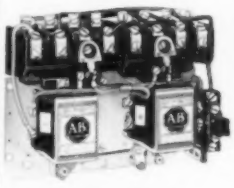
D. C.
MOTOR STARTERS
with modern
SOLENOID CONTACTORS

With Allen-Bradley, you get D. C. motor control that is *completely modern!* It uses the simplest switching mechanism yet conceived . . . the solenoid contactor with only ONE moving part. There are no bearings to stick . . . no jumpers to break. This assures millions of trouble free operations. And the double break, silver alloy contacts never need maintenance. Available in ratings up through Size 4. Write for details.

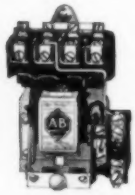
CONTACTORS

Bulletin 202 solenoid type contactor. In ratings to 150 amp. Also, clapper type to 600 amperes.

FULL VOLTAGE STARTERS

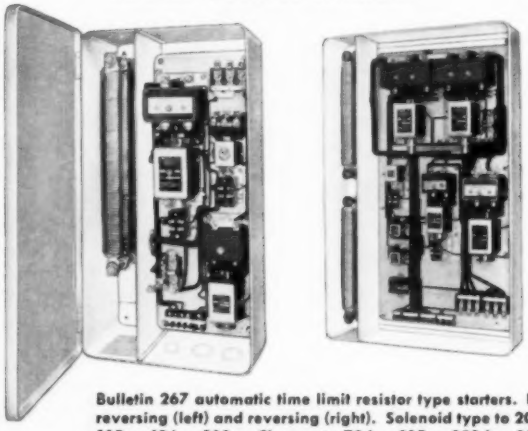


Bulletin 205 full voltage reversing starter. Ratings to 1½ hp, 115 v; 2 hp, 230 v.



Bulletin 209 full voltage starter. Available in ratings up to 1½ hp, 115 v; 2 hp, 230 v.

REDUCED VOLTAGE STARTERS



Bulletin 267 automatic time limit resistor type starters. Non-reversing (left) and reversing (right). Solenoid type to 20 hp, 115 v; 40 hp, 230 v. Clapper to 75 hp, 115 v; 150 hp, 230 v.

9-58-MR

ALLEN-BRADLEY
MOTOR CONTROL
QUALITY

MAIN OFFICE
and Factory
1316 S. Second St.
Milwaukee 4, Wis.

In Canada: Allen-Bradley Canada Ltd., Galt, Ontario

When you need plastics

...it pays to call an

AUTHORIZED PLEXIGLAS DEALER

Here's why: He is a one-stop source for complete service on PLEXIGLAS® acrylic plastic and a wide range of other plastics and accessories such as cements, paints and cleaners. He is qualified to give fabrication assistance and technical advice. And above all, he can give you prompt delivery on almost any size and thickness of PLEXIGLAS—clear transparent sheets ... transparent and translucent colored sheets . . . patterned, corrugated and extruded sheets . . . and rods and tubes.

PLEXIGLAS®

Look for this familiar trademark in the Yellow Pages of telephone directories in most major U.S. cities.

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ROHM & HAAS COMPANY

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Representatives in principal foreign countries

Canadian Distributor: *Crystal Glass & Plastics, Ltd., 130 Queen's Quay East, Toronto, Ontario, Canada.*

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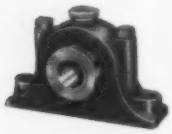
FLEXIDYNE
THE DRY FLUID DRIVE
100% efficiency at full load!



DODGE-TIMKEN
America's Quality Pillow Blocks!

SEALED-LIFE V-BELTS
The life is sealed in!

•

Write for Bulletins!

- Flexidyne Dry Fluid Drives and Couplings. Bulletin A-640-A.
- Roller Bearings. Load ratings, dimensions, etc. Bulletin A-638.
- Sealed-Life V-Belts. Complete data and sizes. Bulletin A-606-A.

DODGE MANUFACTURING CORPORATION
2700 Union Street • Mishawaka, Indiana

DODGE
of Mishawaka, Ind.

For more facts circle 613 on Reply Card

NEW PRODUCTS

(Begins on page 176)

clude completely cleanable coils and "winter-summer" dampers that permit outdoor installation in severe climates. Available capacities range up to 18,000,000 Btu/hr under standard conditions. Suggested applications include: water, oils, solutions, coolants, quench baths, lubricants, others. Niagara Blower Co.

23—WELDER CONTROLLER is highly flexible

This line of non-synchronous electronic combination welder controllers is designed to give performance required on high speed production lines and flexibility to meet changes in materials and designs. Increased

flexibility and simplified maintenance are effected by functional breakdown of the control into individual panels for sequence timing, power supply, valve operation and contactor firing. The combination control with 600 frame contactor has provision for either 200- or 400-amp QMB fusible disconnect switch, 3B or 5B timer, tube or relay control of the air valve, and tube or relay firing of ignition contactor. Provision is made for plug-in addition of heat control, slope control, current regulator, forge delay, dual control functions. Bulletin SM-277 gives details. Square D Co.

24—EXCHANGE RESIN minimizes pressure drop

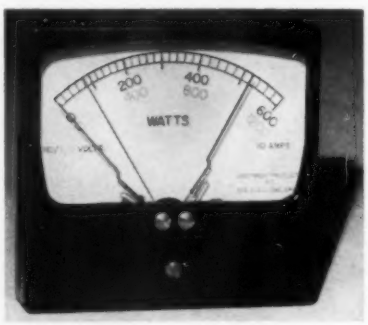
Nalcite HCR-W is a cation exchange resin said to have greater physical stability than previously attained in a cation exchanger. The almost colorless beads are free of internal stress and strain, company says, and bead breakage, which creates fines that cause pressure drop build-up, is virtually eliminated. Operating temperatures as high as 250 F are claimed not to affect stability or capacity, making Nalcite HCR-W particularly suitable for use in hot-lime zeolite water treating plants. Company anticipates extensive use of Nalcite HCR-W in mixed bed demineralizers since its resistance to bead breakage will prevent fouling of the anion exchanger with fines from the cation material. National Aluminate Corp

25—ACOUSTICAL UNITS for exposed-grid ceilings

Fissured Minaboard Panels are incombustible and designed for use in exposed-grid ceiling installations. Tiny, sound-absorbing crevices scattered over the face of the material give an appearance not previously available in large, fire-safe lay-in units, it is pointed out. Made of mineral fiber, the new acoustical product comes finished with a washable white paint. Because of its high density, Fissured Minaboard "eliminates breathing," says manufacturer, and dirt does not build up on its surface, since it resists the passage of air through the ceiling. This density, and the composition of the board, serve as a barrier to sound transmission. Panels are 24 by 48 in. Armstrong Cork Co.

26—WATTMETER has locking contact feature

Direct monitoring and control of electrical power by a single instrument is reported possible with this locking contact wattmeter. With the locking contact feature, high and/or low limits of wattage may be preset, with control action initiated when a limit is reached. Limits are

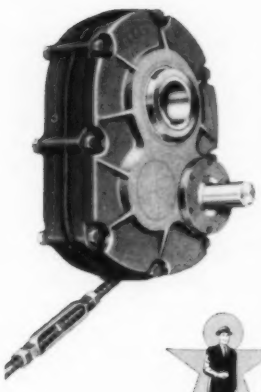


set by pointers, and control action may be any of several forms.

In this instrument, a core magnet movement has been added to the movement of a standard dynamometer type wattmeter. The former is on the same plane as the voltage coil of the wattmeter and moves with it as it turns within the field of the stationary current coil. When

THERE'S QUALITY IN TORQUE-ARM

...AMERICA'S MOST WIDELY USED SHAFT-MOUNTED SPEED REDUCER



Extreme ruggedness and top quality are built into every detail of the Dodge Torque-Arm Speed Reducer—from the specially heat treated helical steel gears to the corrosion resistant semisteel housing. Broad demand has made it necessary to add sizes until today Torque-Arm is America's most complete (and most widely used) line of shaft-mounted speed reducers. Capacities range from 1 to 100 hp; output speeds from 12 to 378 rpm.

Torque-Arm is mounted on the driven shaft, in any vertical or horizontal position. It is anchored by the torque-arm fastened to any fixed object. No need for foundation, flexible coupling, sliding base. No lining up difficulties. The unit is driven through any V-belt drive. Savings up to 1/3 are possible and Torque-Arm's efficiency is high. It delivers 97% efficiency in double reduction models; and almost 99% in single!

Ask you local Dodge Distributor—or write us for bulletin.

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2700 Union Street, Mishawaka, Indiana

CALL THE TRANSMISSIONEER
—your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new, cost-saving methods. Look in the white pages of your telephone directory for "Dodge Transmissioneer."

DODGE
of Mishawaka, Ind.

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two superior open steel
FLOOR GRATINGS
BY GLOBE

1 Safety GRIP-STRUT®

FOR MAXIMUM SAFETY ALL OVER YOUR PLANT

Important Safety Features

★ FIRE PROOF ★ SLIP PROOF
★ MAXIMUM STRENGTH
★ MINIMUM WEIGHT

PATENTED

Important Economy Features

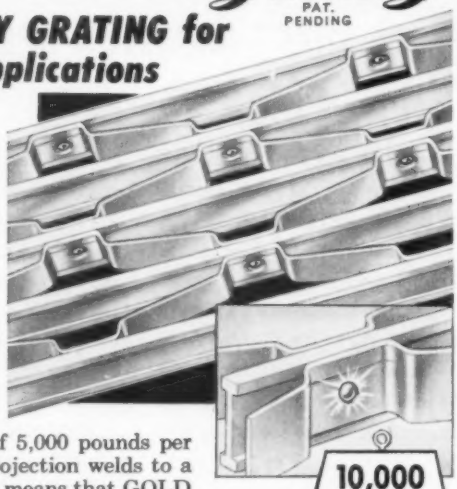
★ All one piece, not welded, riveted or expanded
★ Open space in excess of 55% of area for easy access of light and air
★ No extra supports necessary—channels are integral part of the material. ★ Self cleaning
★ Cut and installed like lumber by your own maintenance force. ★ Low in original cost. ★ For balconies, no secondary sprinkler heads needed

Ideal for work platforms, stair and ladder steps, flooring, balconies, catwalks, machinery guards, fire escapes and for original equipment safety treads.

2 GOLD NUGGET® WELDED grating PAT. PENDING

The QUALITY GRATING for Heavy Duty Applications

★ 3/16" projection weld nugget for greater rigidity and strength
★ Vertical alignment of the main load bar assured
★ All bars are load carrying bars including secondary bars
★ Anti-skid pattern



PROJECTION WELD

Each secondary load bar (A), as projected welded to the primary load bar (B) has a shear strength of 5,000 pounds per weld. There are 28 such projection welds to a square foot of grating. This means that GOLD NUGGET Welded Grating can sustain greater shock loads than other gratings.

For the complete details of these revolutionary new gratings, write for new catalogs today. Distributors in all principal cities. Consult the yellow pages in your phone book under "GRATING".

108

PRODUCTS DIVISION
The GLOBE Company MANUFACTURERS SINCE 1914
4016 SOUTH PRINCETON AVENUE • CHICAGO 9, ILLINOIS

For more facts circle 615 on Reply Card

NEW PRODUCTS

(Begins on page 176)

power being used reaches a preset limit, a contact on the indicating pointer touches a contact on a fixed pointer. A circuit is closed to an external slave relay that triggers control action. Current through the contacts also flows through the coil of the core magnet movement, which develops sufficient torque to lock the contacts together. The core magnet movement also furnishes damping torque for the voltage coil. In present models of the wattmeter, field coil capacity ranges from 1 to 20 amp a-c. Assembly Products, Inc.

27—POWER ROOF EXHAUSTER of heavy gage aluminum

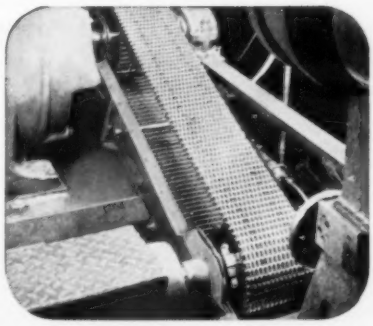
All exposed surfaces of the Columbus Series C Power Roof Exhauster are of heavy gage aluminum for durability, light weight, and appearance. Aluminum, non-overloading centrifugal wheels are coupled in direct drive to ball bearing motors which are mounted out of the exhausted air stream and isolated from the housing for quiet operation. Range is 75 to 2200 cfm. Weathertight construction is assured with the one-piece inlet cone and curb, company states. Greenheck Fan & Ventilator Corp.

28—STRIPPABLE COATINGS protect steel aluminum

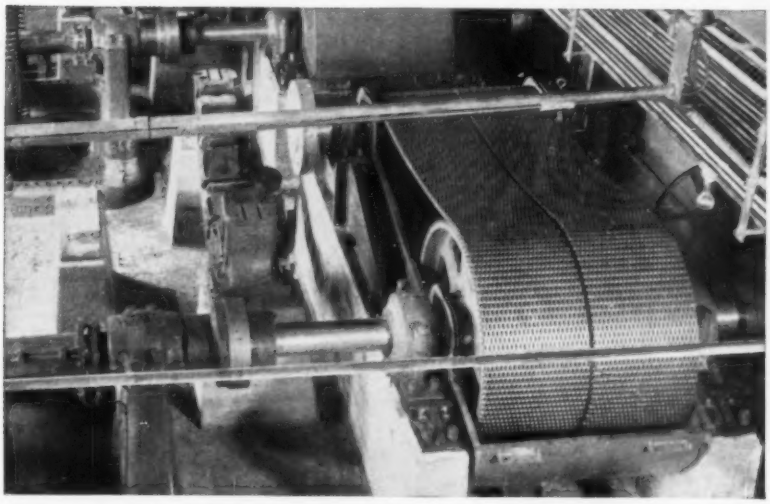
Metalguards S-5119 and 5219 are introduced specifically for outdoor protection of stainless steel and aluminum architectural metalwork, during erection and construction as well as shipment and storage. These coatings are plastic solutions in organic solvents which on air drying form tough, flexible and strippable films. Manufacturer says these films have outstanding resistance to degradation when exposed for long

How LINK-BELT silent chain comes through industry's stiffest tests

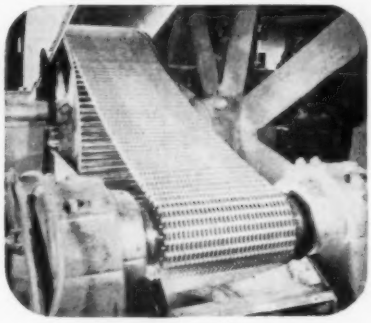
No other drive can do the same



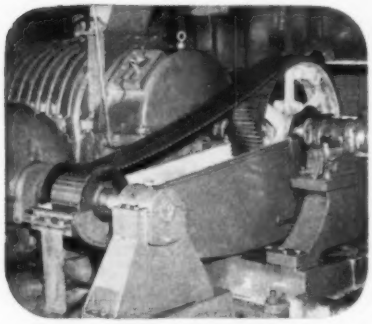
HIGH SPEED. Link-Belt silent chain drives on newspaper presses often operate at speeds of 4000 to 5000 feet per minute.



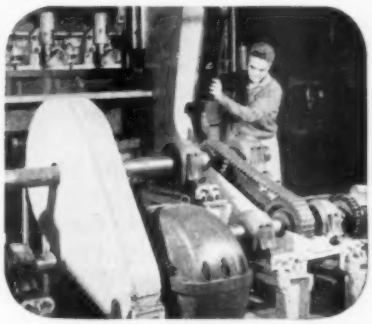
LARGE OR SMALL HP. Two 24-in. strands of Link-Belt silent chain on turbines powering 850-kw generators comprise one of the largest chain drives ever built. Silent chain provides high efficiency (over 98%) on large or fractional hp drives.



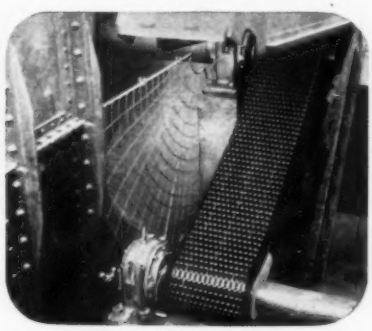
ADVERSE OPERATING CONDITIONS. Effects of heat, humidity and cold are minimized with Link-Belt silent chain drives.



LARGE RATIOS. Link-Belt silent chain operates efficiently at ratios as high as 10-to-1, with resulting space economies.



LIMITED SPACE. Easy to assemble in close quarters, Link-Belt silent chain permits built-in drives, compact housings.



LONG LIFE. Link-Belt silent chain has given more than 30 years of uninterrupted service on ventilating systems.

Ask your Link-Belt office or authorized stock-carrying distributor for

88-page Book 2425

LINK-BELT

SILVERSTREAK SILENT CHAIN DRIVES

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 14,680

For more facts circle 616 on Reply Card

What's the best way to heat a pipe?

Your CHROMALOX Man has the Answer

Each of the above pipe heating methods has particular advantages. Your Chromalox Man can help you determine the one best electrical answer to your individual problem.

Maybe Chromalox Strip Heaters best meet your operating conditions. Quickly and easily installed at low initial cost, they provide uniform, accurate temperatures by either automatic or manual control. Lengths from 4″ to 96″ can be clamped in place side by side, or, half-round strip heaters may be bolted together to a minimum inside radius of 3½″. Sheath material and terminal placement vary according to your application.

Or perhaps Chromalox Tubular Heaters are the answer. These versatile heaters are available in straight lengths or bent to any shape you may require. Only Chromalox Tubular Heaters have the patented triangular cross-section that puts more heater area into surface contact for maximum heat transfer.

Still other pipe heating problems can be solved quite simply by one of several Chromalox "wrap-around" type heaters. Chromalox Pre-Fab woven electric heaters may be held in place by lacing, adhesives or snap-fasteners. Chromalox Thermwire Tape and Cable answer hundreds of other problems that can be solved by low temperature localized heat.

What's the best way for *you*? Just call your Chromalox Representative, listed on the opposite page. He has the fast, clean, safe, accurate, economical ELECTRICAL ANSWER. He's backed by the world's largest stock of industrial electric heaters, ready for immediate shipment. And, he offers factory design engineering service for special applications.

2622

CHROMALOX
Electric Heat
INDUSTRIAL • COMMERCIAL • RESIDENTIAL
Edwin L. Wiegand Company
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Call Chromalox
for the man with the
ELECTRICAL ANSWERS
to your heating problems

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Mohawk 4-6113
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L. R. Ward Company
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Riverside 1-6279

DAVENPORT, IOWA
Volco Company
215 Kahl Building
Phone: 3-2144

DENVER 2, COLO.
E. & M. Equipment Co.
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Glendale 5-3651
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Dittman and Greer, Inc.
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Diamond 6-9606

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Gordon Hatch Co., Inc.
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Room 211 Derby Building
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2622

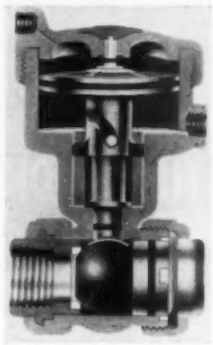
NEW PRODUCTS

(Begins on page 176)

periods to extremes of weather, and having excellent abrasion resistance, they act as barriers to and are not attacked by moisture, chemicals, chemical fumes. The coatings are reported applicable wherever temporary protection of metals, glass, ceramics, marble and tile against plaster, mortar and muriatic acid or scratches is required. They are claimed to remain strippable for a year. Guard Coatings Corp.

29—VALVE OPERATOR for the plastic piping systems

An all-plastic molded valve operator which contains no metallic parts has been designed for contemplated or existing plastic piping systems carrying corrosive liquids. It can be used in hydro-pneumatic,



servo or remote systems as well as enclosed or automatic systems. Features include long service life, corrosion resistance, small size and light weight, and easy disassembly for cleaning or part replacement. It will operate at pressures of 15 psi with the corrosive mother liquid as the pressure agent, it is explained; however, when operating pressure is that of the mother liquid, valve operator will not function on pressures in excess of 150 psi. It is constructed for temperatures to 300 F. Available materials are PVC, Kralastic, Penton, Profax. Chemtrol Div. Tapered Air Products.

30—CHEMICAL PRODUCT clears sewers and drains

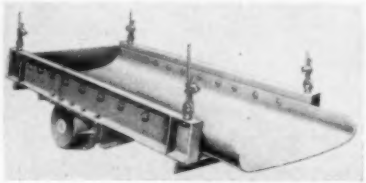
Dig-No-Mor is announced as a chemical product designed to safely dissolve paper, hair, grease, lint, coffee grounds, cloth and various organic substances which frequently clog pipes, drains, septic tanks, sewers and toilets. It is also claimed to inhibit growth of tree roots in soil pipes. A small amount of Dig-No-Mor is placed in the clogged or sluggish drain and flushed with a gallon of hot water. Periodic use of product is said to keep drains clear. Associated Specialties Co.

31—MIST COLLECTORS for wet machining operations

Three models of mist collectors are specifically designed for use in wet machining operations of automatic screw machines, tool grinders, surface grinders, centerless grinders, air foil grinders, electrolytic grinders, thread grinders and other mist producing operations. Among advantages cited for the collectors are: elimination of unpleasant or toxic mists; reduction of plant maintenance costs and improvement of visibility by eliminating floating moisture that clings to walls, windows and ceilings; elimination of slippery floors caused by settling fog; reduction of fire hazards; conservation of coolant. Collectors are designed to stand on floor or can be mounted on walls or suspended from ceilings or beams. Torit Mfg. Co.

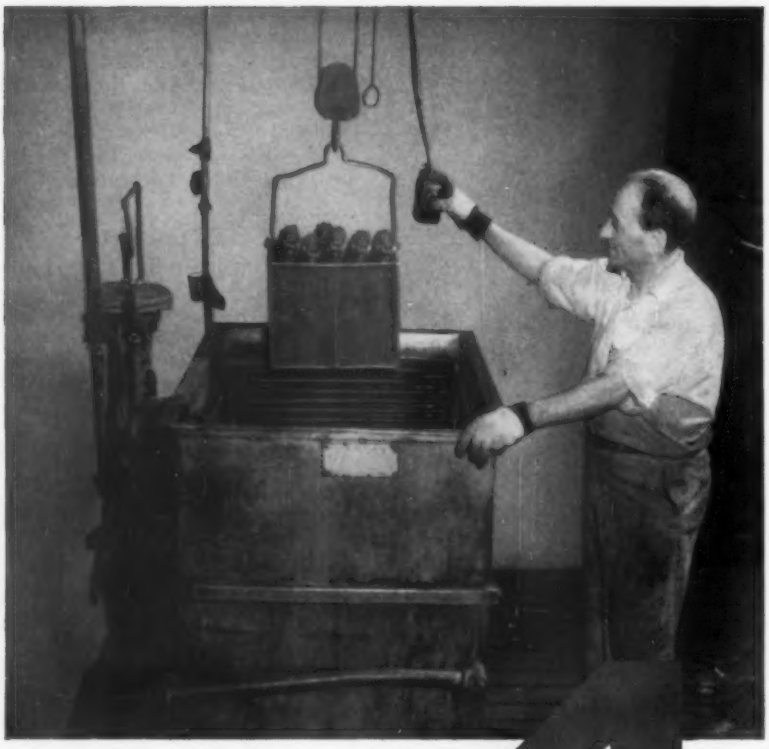
32—VIBRATING FEEDER with broad application

The MC Feeder handles materials from heavy, sticky ores to light, dry grains. This motorized counterweight feeder is claimed capable of feeding a variety of bulk materials —hot, abrasive, fines or lumps—direct from bin or hopper at a controlled, uniform rate. It is a compact low-headroom unit that can be installed as an integral package in al-



most inaccessible locations, says manufacturer, and its unitized trough construction prevents leakage and spills. The feeder consists of a trough and motorized vibrator drive, mounted on a channel frame. The vibrator is driven by a motor with double-extended shaft on which counterweights are mounted. The drive is an integral part.

The unbalanced arrangement of the weights imparts a straightline oscillating or vibrating motion to the trough, lifting the material upward and forward. The feeder can be cable and spring-suspended un-



degreasing compounds last up to **4 TIMES LONGER** with a **PUROLATOR** filter

You'll spend up to 60% less on degreasants when you filter them with a Purolator filter. The filter traps most of the contaminants, so the compound lasts up to 4 times longer. You just change the filter instead of changing the compound—much easier and much cheaper.

The compounds stay like new longer because the filter picks up the contaminants as soon as they appear, prevents them from cutting down on degreasing efficiency.

Original installation of the filter is simple, too. The motor and pump that circulate the degreasing fluid will also pump the compounds through the filter.

This is just one of the ways Purolator can help reduce operating costs and improve product quality. For further details contact your nearest Purolator Industrial Sales Agent, or the Purolator Industrial Sales Division, Rahway, N. J.

Filtration For Every Known Fluid

PUROLATOR

PRODUCTS, INC.

RAHWAY, NEW JERSEY AND TORONTO, ONTARIO, CANADA

For more facts circle 618 on Reply Card

NEW PRODUCTS

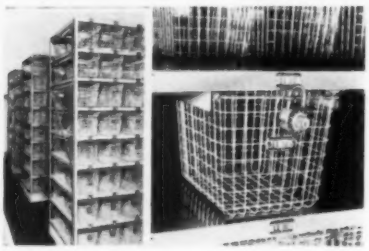
(Begins on page 176)

der a hopper or spring-mounted on supports from the floor. Twelve sizes include widths of 2, 3 and 4 ft, lengths from 5 to 8 ft, and capacities to 250 tons an hour. Details are in Leaflet 2669. Link-Belt Co.

To receive product data circle item numbers on the handy Reader Service Cards provided on pages 221-222.

33—RACKS, BASKET offer space-saving storage

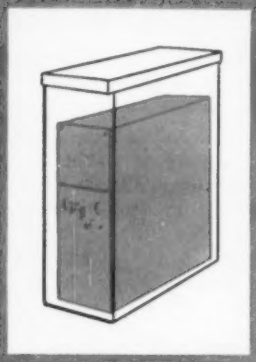
These basket racks and wire baskets offer storage facilities for employee clothing, lunches, tools, parts, equipment, etc., with advantages of ventilation, easy visual inspection and provision for locking. The racks



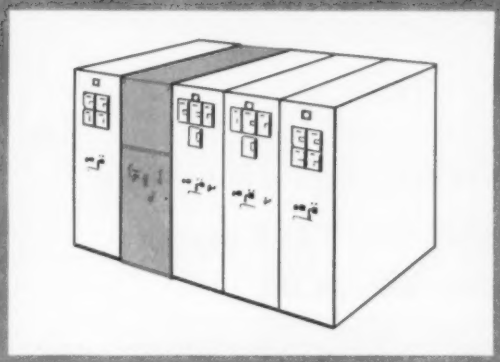
are heavy gage steel, available in 73, 83, and 93-in. heights and 40-in. widths. They may be had in single-face construction for mounting against walls or as double-faced units where space facilities permit access to both sides of the rack. They also may be bolted end-to-end. In depth, the single-face units measure 13-½ in.; the double-faced racks—27 in. Dividers are welded to shelves between basket locations and at the end of each rack section. For mobility, racks are available mounted on casters. Penco Metal Products Div., Alan Wood Steel Co.

34—FLOOR FINISH lasts long, and holds its gloss

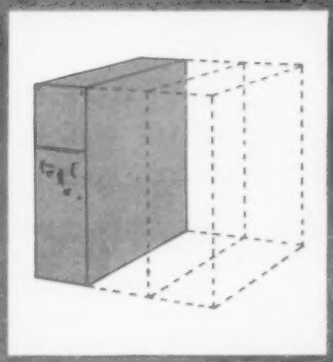
Called an oil-free urethane clear, this floor finish is claimed to have wearability and gloss retention properties two to three times greater than finest varnishes. Floors finished with it are said to collect little dirt because of the hardness and exceptional gloss of the coating. Urethane films are also resistant to oil and grease, it is pointed out. Ease of maintenance is reportedly shown on textile-mill floors where



indoor or outdoor units



line-up with G-E Metal-clad



single or multiple units

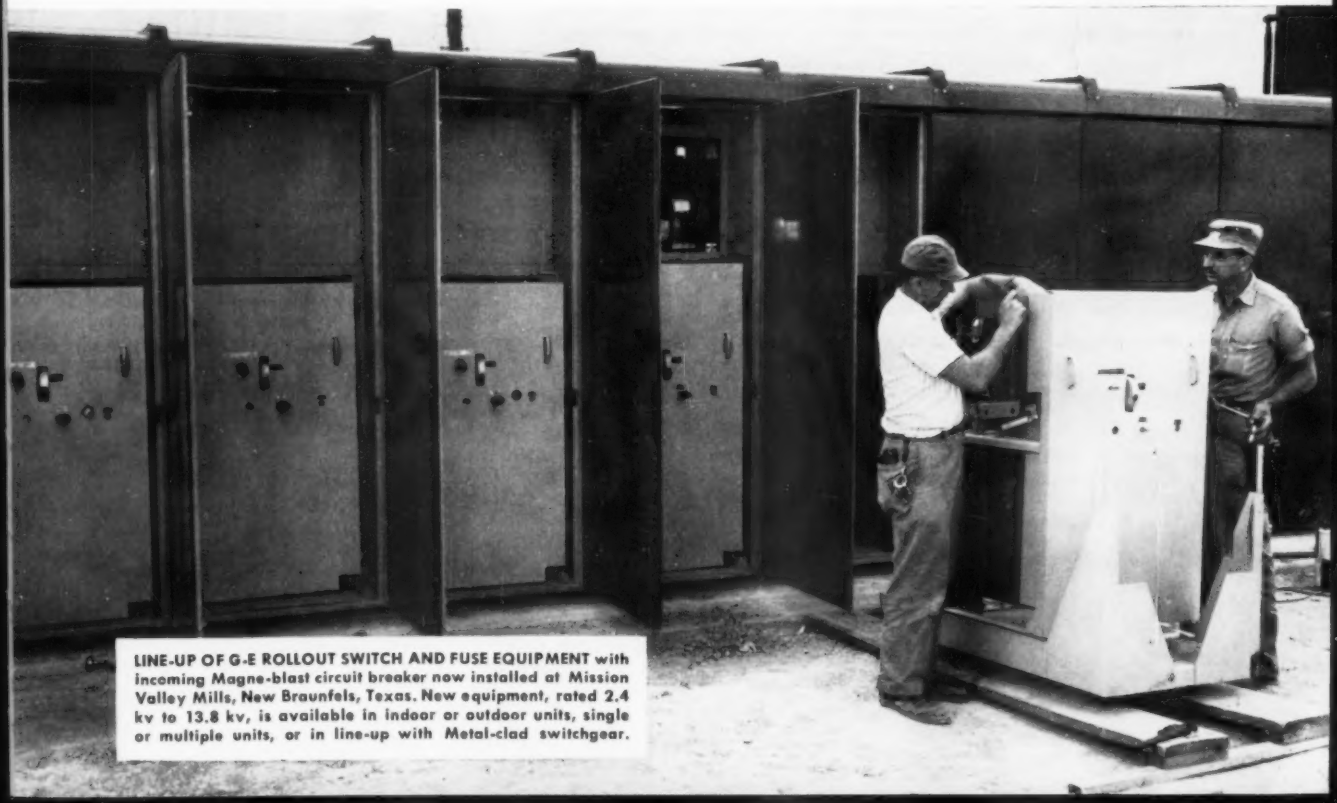
Installation versatility with General Electric ROLLOUT Switch and Fuse Equipment

You have a choice of construction types with General Electric's Rollout Switch and Fuse Equipment. It can be furnished to suit your installation needs—indoor or outdoor units, single or multiple units, or in line-up with General Electric Metal-clad.

Whichever type of construction you select you get improved protection, greater safety, and ease of maintenance and inspection. For more information call your nearest General Electric Apparatus Sales Office or write for Bulletin GEA-6623, General Electric Co., Section A514-5, Schenectady, New York.

Progress Is Our Most Important Product

GENERAL ELECTRIC



LINE-UP OF G-E ROLLOUT SWITCH AND FUSE EQUIPMENT with incoming Magne-blast circuit breaker now installed at Mission Valley Mills, New Braunfels, Texas. New equipment, rated 2.4 kv to 13.8 kv, is available in indoor or outdoor units, single or multiple units, or in line-up with Metal-clad switchgear.

A COMPLETE LINE OF
LIVE ROLLER CONVEYERS
engineered and standardized by

MATHEWS

A belt-driven Live Roller Conveyer with remotely-controlled air-operated deflectors is the heart of this modern shipping room dispatch system.

Mathews belt-driven Live Roller Conveyers are widely applied in modern package-handling systems. Packages deflect well from live roller lines, and they can be located at any reasonable level between the floor and ceiling.

Live Roller Conveyers can be reversible, and add greatly to the flexibility of the conveyer systems of which they are a part.

Write for Bulletin G.P.53 and Catalog 856 today.

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MATHEWS
Over Fifty Years of Leadership in Mechanized Handling

For more facts circle 620 on Reply Card

NEW PRODUCTS

(Begins on page 176)

sticky accumulations of lint and starch do not adhere to test areas.

According to announcement, this finish dries rapidly under what would be adverse conditions for many materials; in fact, urethane finishes cure by reaction with atmospheric moisture. In summer, when humidity is 50 per cent or higher, "tack-free time" is reported 1 to 2 hr and "sand and recoat time" is 3 to 4 hr. Also claimed is ability to dry without wrinkling when applied in heavy coats. Adhesion over new wood, concrete and properly sanded old wood finishes is claimed excellent. It is applied like standard varnishes and shellac, with or without thinning. E. I. du Pont de Nemours & Co.

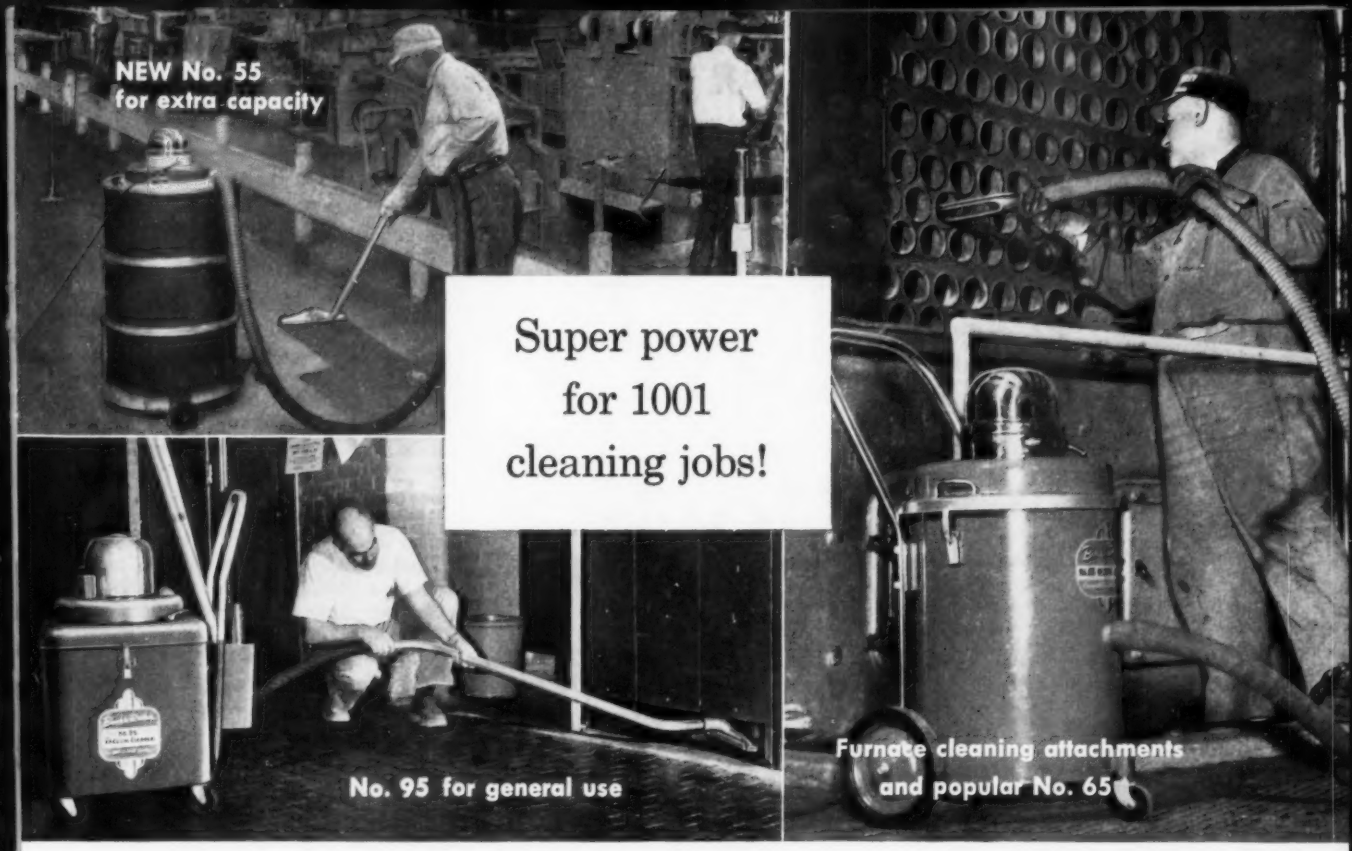
35—CHAIN VISES are easy to use, versatile

Faster, easier tightening features are announced for Pipemaster Chain Vises. The heavy duty units also have a side handle designed for better leverage and, because the operator can't hit the bench, safer adjustment. The Pipemaster 1PVC

has a ⅛- to 2½-in. capacity, while the Pipemaster 2PVC has a ⅛- to 4-in. capacity. Both have reversible front and back jaws with an interlocking principle. A fifth jaw in the middle offers more support to avoid deforming small pipe. Reversing or replacing jaws is done by loosening a single bolt which holds them to the base. The Erie Tool Works.

36—DEHYDRATION UNIT is compact and low in cost

This dehydration unit is claimed to make possible, economically, dew points of —150 F and 5-micron filtration of air, gas or liquids. According to manufacturer, these dehydrators will remove 1 lb of water

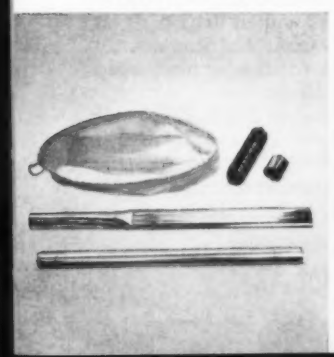


A Black & Decker Vacuum Cleaner for every use!

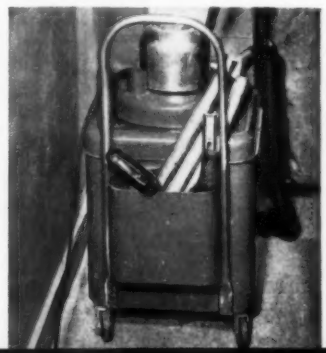
ACCORDION TYPE HOSE extends to 10 feet. Tough, durable, sucks in bolts, nuts without harm. Wraps around motor housing for easy storage.

VERSATILE—COMPACT enough to fit through narrowest of passageways. Completely mobile. Roll easily over rough floors. No. 55 mounts on 55 gal. drum and dolly.

COMPLETE ACCESSORY LINE for every need. For furnace cleaning combine No. 65 Vacuum Cleaner with attachment assortment or select No. 648 Furnace Cleaner.



HANDY ACCESSORY RACK on No. 95 carries all attachments you need to do the job. Attached to handle, it can be removed easily for quick cleaning.



Whatever your cleaning problem—office, halls and carpets; factory floors or scrap pick-up, there's a Black & Decker Heavy-Duty Vacuum Cleaner to do the job! All completely mobile—all packed with twice the suction—with plenty of guts for both wet and dry cleaning.

Choose the model you need: No. 65—perfect for general all around use, takes 3¾ gallons of liquid; ⅞ bushel dry. No. 95 for constant, heavy-duty use —13 gallons wet; takes 1½ bushel dry. No. 55 for extra-capacity—mounts on a 55 gallon drum. Mail coupon for free demonstration.

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Look Under "TOOLS-ELECTRIC" in Yellow Pages

Black & Decker®

Quality Electric Tools . . . Power-Built to set the pace

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THE BLACK & DECKER MFG. CO., Dept. 0809, Towson 4, Md.
(In Canada: Brockville, Ontario)

Please arrange a demonstration of
☐ No. 55, ☐ No. 65, ☐ No 95 Vacuum Cleaner(s)
☐ Send additional literature

Name.....Title.....

Company.....

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City.....Zone.....State.....

For more facts circle 621 on Reply Card

low cost light

thanks to **CHAMPION**

LIGHTMANSHIP

NEW MAINTENANCE MANUAL— another example of Champion LIGHTmanship, an attitude and aptitude that makes sure you get all the light you pay for. Many useful, cost-saving hints have been added in this new edition of the popular guide that has proved to be of great practical value to lighting men everywhere. Copies available on your letterhead request.

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Your best buy in lamps

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Lynn, Massachusetts
A division of Consolidated Electric Lamp Co.

For more facts circle 622 on Reply Card

NEW PRODUCTS

(Begins on page 176)

for as little as 7 cents, where the former cost ranged from $2.50 to $3.75. Also, these dehydrators range in size from 2 to 8 in. in diameter, much smaller than many designed for comparable service.

Key to this dehydrator's success in obtaining low points is its compensating cartridge, says company. The water-soluble chemical desiccant in the cartridge is under constant spring compression, it is explained, and as this chemical dissipates on water contact, the spring adjusts toward the point of contact, eliminating voids and fissures. Low initial and installation costs as well as low maintenance cost are reported to make this unit an economically feasible solution to the problem of the elimination of freezing and corroding in air-operated equipment. Dehydrators, Inc.

37—CHARGERS handle the lead acid batteries

Each of four new models of Precision Charge line of lead acid battery charges accommodates a range of battery sizes, has controls for automatic operation and new protective devices for both battery and charger. They handle batteries with capacities between 250 and 800 amp-hr and six, nine, 12 or 15-18 cells. They operate on the "taper charge"

principle in which the charge begins with high currents and reduces automatically to low, finish-rate currents at the end of the charging time. The reduction follows a continuous curve, rather than a series of steps, it is explained, and normal charging time for a fully discharged battery is 8 hr.

External ampere-hour selector and finish-rate controls adjust charger to particular battery being charged. When the charger is used for only one battery, these adjust-

Why Every Steam Heated Unit Needs its Own Steam Trap

. . . the theory, practice and proof of "unit trapping" for top temperatures

Using an individual trap for each steam heated unit, including each separate coil, chest or chamber of a machine—pays off for the user. Here are just two examples:

1. On a creamery dryer

Drainage Method	*Air Temperature*
Restricted Blow-thru	250°
Group trapping (1 trap for 8 coils)	225°
Armstrong Unit Trapping (8 traps—1 for each coil)	**309°**

2. On a platen press

Drainage Method	*Processing Time*
Restricted Blow-thru	50 minutes
Group Trapping	35 minutes
Armstrong Unit Trapping	**25 minutes**

Why Unit Trapping Works Best

It is reasonable to assume that no two steam heated units will have *identical* condensing rates. Even the slightest difference in rate will cause a difference in steam pressure drops through the units. Here's where the trouble starts. Condensate from each unit may flow to the trap. But, what about air and other non-condensibles in the system? A difference in pressure drops too small to be indicated by an ordinary pressure gauge will permit backflow of steam from the higher pressure units to the lower pressure units. This backflow of steam may even impede flow of condensate from the lower pressure unit to the trap . . . and it will definitely impede or block off flow of air to the trap. The result is sluggish heating, reduced temperatures, reduced output, fuel waste and increased possibility of corrosion. Figures 1, 2 and 3 diagram the action.

Unit Trapping Not Costly

No engineer wants any more mechanical devices in his plant than are absolutely necessary. But, the moderate additional cost of using two or more small traps, instead of one big one, is saved over and over again in improved efficiency.

If the traps are Armstrong, maintenance is no problem. And users frequently tell us that Armstrong traps outlast others two and three to one.

Steam traps usually represent a fraction of 1% of the cost of the equipment they drain. Does it make good sense to lose 10% or more of equipment capacity to save a few dollars on traps?

Why not test Armstrong unit trapping in your plant. If you are not completely satisfied with the results you can return the traps for a full refund of the purchase price. There is little to lose—lots to gain. Call your local Armstrong Factory Representative or Distributor, or write **Armstrong Machine Works, 9124 Maple St., Three Rivers, Mich.**

ASK FOR the 44-page Steam Trap Book and reprint of article on Unit Trapping.

801ST

How Different Condensing Rates Can Slow Production

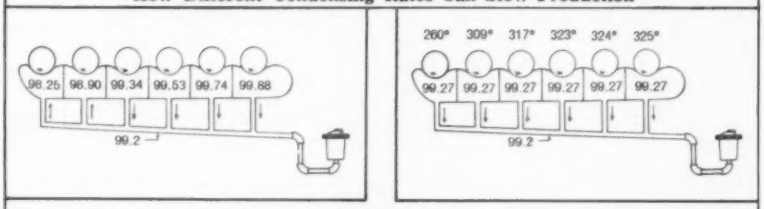


Fig. 1 This is a 6-roll ironer shortly after it has begun operating on 100 psi steam. When cold, wet material passes over chest 1, steam condensing rate is high and pressure drops accordingly. The pressure drop in chest 2 will not be as great, and so on down the machine as the material becomes progressively hotter and drier. Average pressure in the chests then is 99.27 lbs., and drain header pressure is slightly less, about 99.2 lbs. Under these conditions, steam from drain header enters chests 1 and 2 (as indicated by arrows at side of drain lines) because of pressure difference. Though condensate from chests drains by gravity, air can't leave chests countercurrent to incoming steam. Fig. 2 shows what happens next.

Fig. 2 This is the same 6-roll ironer after it has been operating a while. Air has accumulated in chests 1 and 2, reducing condensing rate and decreasing pressure drop. This process repeats itself down the line until pressures are as shown—that is, enough air will accumulate in each chest so that condensing rates and pressure drops of all chests will be about equal. The net result is shown in chest temperatures which are actual pyrometer readings taken on a 6-roll ironer, drained by a master trap, in a Chicago laundry. The laundry was making 337.9°F steam, but getting an average of only 309.6°F from the ironing surfaces, necessitating slow operation and frequent reruns. Then they tried Armstrong unit trapping—see Fig 3.

How Unit Trapping Prevents Trouble

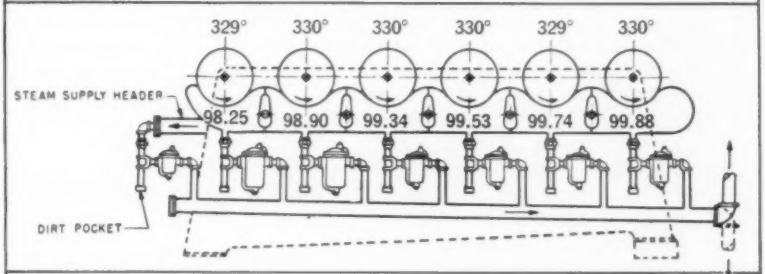
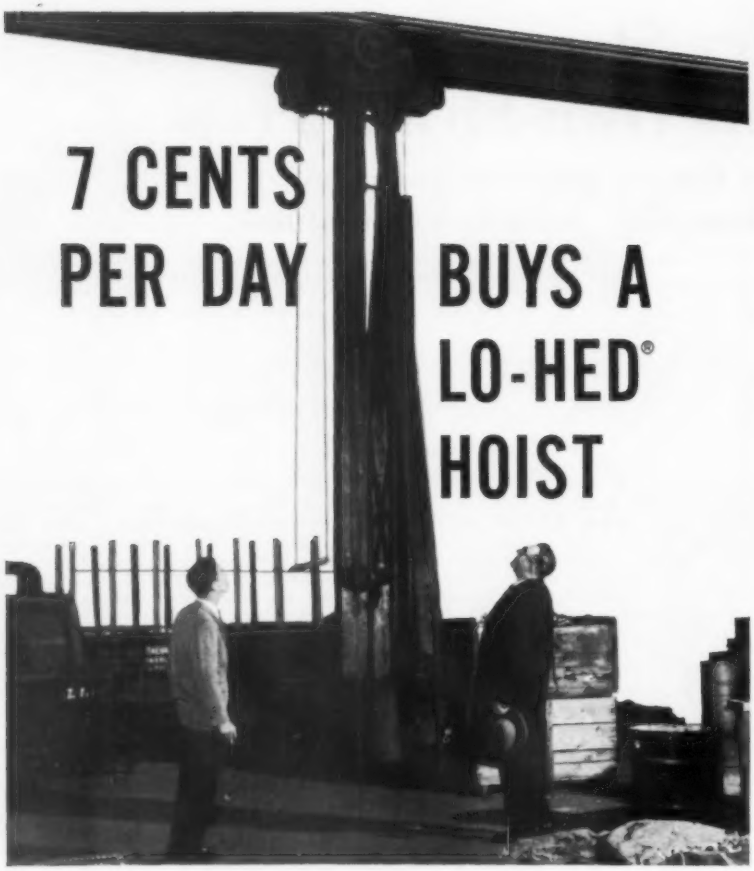


Fig. 3 This is the same 6-roll ironer, now unit trapped. Temperatures shown are also actual pyrometer readings—the average of 329.6°F is 20° higher than with group trapping. This is because air is continually removed from each chest into the drain header, and cannot get back into any chest.

ARMSTRONG STEAM TRAPS

For more facts circle 623 on Reply Card



"This Lo-Hed Electric Hoist has been in service in our Galvanizing Plant for 24 years and is still going strong. Our Plant people feel this is a remarkable record, considering the heavy-duty nature of our operations. Cost of maintenance has been very low, and we feel this hoist has many years of useful life left in it."

Said by Bill McCormick, Purchasing Agent for Enterprise Galvanizing Company, Philadelphia, Pennsylvania, seen on the left above talking to Ed Boyer, Sales Manager of AE's Materials Handling Division.

Lo-Hed Electric Hoists COST LESS because they LAST LONGER

Based on current price, this Lo-Hed Hoist at Enterprise Galvanizing shows a capital cost of less than 7 cents per day . . . and it still looks good for another 24 years.

No other similar hoist offers as many features — and there's a Lo-Hed exactly right for your job

Lo-Heds are available with headrooms as low as 11"; capacities ¼ to 12 tons; all control types, two-speed included; 5 suspensions; shrouded bottom block; 2 automatic brakes; anti-friction bearings throughout. They're full load tested, and are adaptable to any crane or monorail system. Look under "Hoists" in your classified telephone directory for the AE Lo-Hed representative nearest you.

For helpful information on hoists, fill out and mail this coupon today.

Please send me a copy of your booklet on:

☐ "How to select the proper hoist to meet your needs."

☐ "Five things to consider before you buy that hoist."

Name.....

Position.....

Company.....

Address.....

City.....Zone.....State.....

DISTRIBUTORS AND AGENTS: Distributorships and agencies for Lo-Hed Electric Hoists are available in many parts of the country. If you are interested, call or write Ed Boyer, Sales Manager, AE's Materials Handling Division. Dept. H-164

AMERICAN ENGINEERING COMPANY

Wheatsheaf Lane and Sepviva Street

Philadelphia 37, Pennsylvania

Branch Offices: Jersey City • Cleveland • Chicago
Canadian Subsidiaries: Affiliated Engineering Corporations, Ltd., Montreal, P.Q. • Bawden Industries Ltd., Toronto, Ontario

AE Products are: Taylor, Perfect Spread and Vibra-Grate Stokers, Hele-Shaw and Hydramite Fluid Power, Lo-Hed Hoists, Lo-Hed Car Pullers, Marine Deck Auxiliaries

For more facts circle 624 on Reply Card

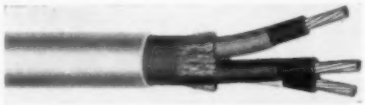
NEW PRODUCTS

(Begins on page 176)

ments are made the first time the charger is used and remain fixed. When unit is used for several batteries (one at a time), the controls are accessible for quick adjustment. The Lincoln Electric Co.

38—INSULATED CABLES wear an aluminum sheath

Now available are rubber (GR-S, oil-base, butyl and silicone) insulated power and control cables sheathed with aluminum. The sheath



is applied by the continuous extrusion process, affording longer continuous lengths than possible with many application methods. According to manufacturer, aluminum sheathed cables offer light-weight protection, are easily worked, can be trained to fit the contour of any installation, are moisture-proof, and offer protection advantages in petro chemical and atomic industries. General Cable Co.

39—TURNING CONVEYOR for the sheets and boards

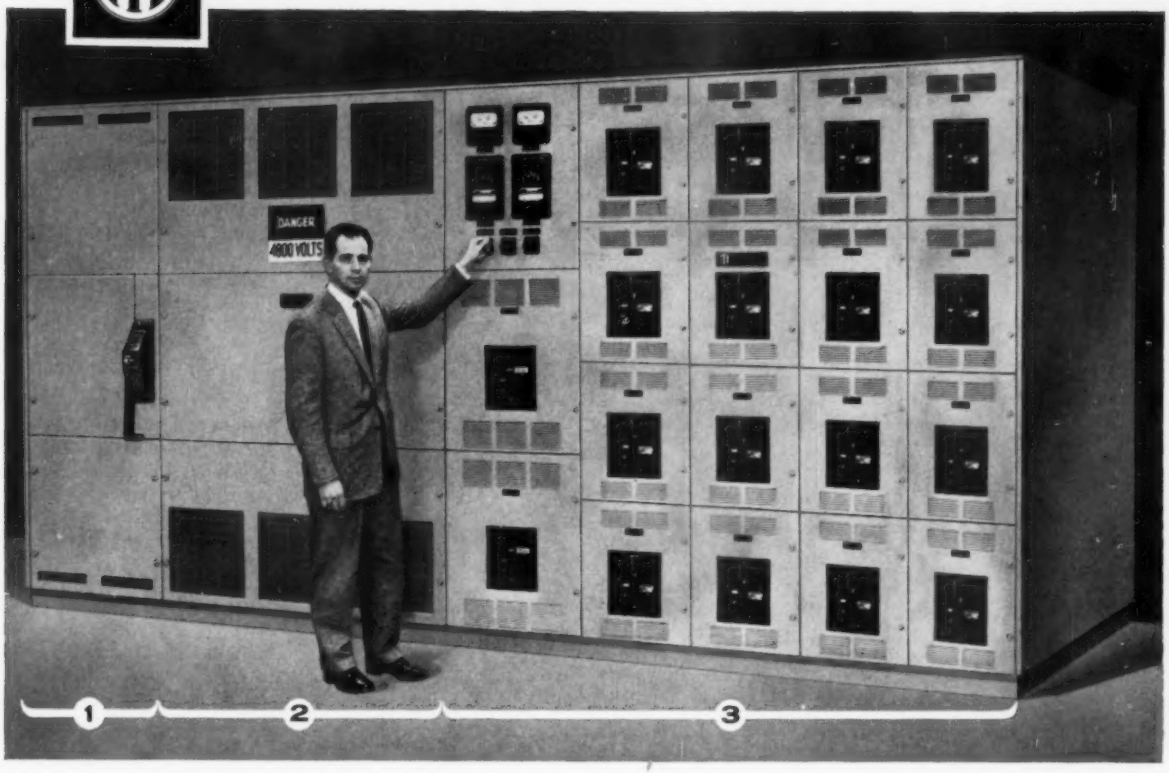
This turning conveyor is designed to convey around a curve any type of sheet and board material. The 5-ft wide conveyor unit, developed for the gypsum board industry, is

suggested for handling plywood, hardboard, sheet metals, paper and plastics. Grooved rollers and wire spring belts transmit power from shaft to shaft in a circular path. The turning section has a 6-ft centerline radius using graduated discs keyed to spring belt driven shafts. Top surface is level, but gives controlled turning action to sheets, singly or in stacks. Curved sections can be furnished for any circular arc. Power-Curve Conveyor Co.

40—MANUAL VALVE for slow control of slurries

Reliable, non-plugging performance claimed for this handwheel operated Ratogate Valve is credited to two

SECONDARY UNIT SUBSTATIONS



(1) **Incoming Section:** Terminal chambers; disconnecting and interrupter switches; roof bushing; metal-clad type HV/switchgear. (2) **Transforming Section:** Askarel or oil-immersed type transformers; ventilated dry type transformers; sealed dry type transformers. All manufactured at I-T-E in Philadelphia. (3) **Outgoing Section:** The new K-Line of low voltage switchgear featuring manually charged or motor charged stored energy quick-make circuit breakers, and all with the closed door drawout feature.

I-T-E assumes all responsibility for your substation requirements

When you place an order for an I-T-E secondary unit substation, you can forget detailed planning, paperwork and the problems of coordinating delivery. I-T-E assumes complete responsibility. It engineers the unit to meet your requirements. It builds the transformers and switchgear. It assembles the complete unit under one roof, testing it to assure ease of installation and top performance. It ships the unit *as one package*, from one location, and ready to install.

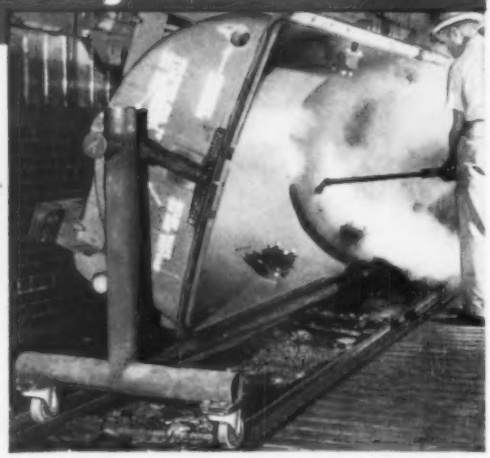
Typical of the extra values found only in I-T-E secondary unit substations is the new quick-make K-Line of low voltage switchgear. A manually charged mechanism in each circuit breaker stores energy in the first 90% of pulldown handle travel, releases it in the last 10%. It also features racking to all positions—connected, test and disconnected—while doors are closed. Both features greatly increase operator safety and reduce maintenance problems. I-T-E secondary unit substations can be supplied for any application, indoor or outdoor, and in any standard rating. For details, contact the I-T-E sales office nearest you. Or write Switchgear Division, I-T-E Circuit Breaker Company, 19th & Hamilton Sts., Phila. 30, Pa. In Canada: Eastern Power Devices Ltd., Port Credit, Ontario.

I-T-E CIRCUIT BREAKER COMPANY
PHILADELPHIA • PENNSYLVANIA

For more facts circle 625 on Reply Card

NOELTING
Faultless
Casters

Cut Costs of Handling Heavy Bulky Loads



Faultless Casters in U tracks easily guide huge reuseable jet engine storage tanks through refinishing and refurbishing operations.

Faultless Handles the Tough Jobs!

600 Series Medium-Heavy Duty Swivel Plate Caster.

Note 2 complete rows of Ball Bearings for easy swiveling action. Special high tensile alloy construction assures extreme strength and high ductility, to withstand shocks. Easily handles loads up to 1500 lbs. per caster. Plaskite (hard tread) roller bearing wheel shown will not chip, is impervious to water, brine oil. Many other styles of cushion and hard tread wheels are available in this versatile Faultless Caster Series.

By combining workstands and materials handling equipment as one Faultless Castered unit, costs are substantially lessened at Sherer Manufacturing Co., Oklahoma City, Oklahoma. These workstand-dollies, equipped with four Faultless 600 Series Casters hold storage tanks through almost 90% of plant operation. Faultless Casters can solve *your* tough materials handling problems with minimum maintenance and manpower costs.

Ask Your Distributor

Your nearby Faultless Industrial Distributor maintains a substantial inventory of Faultless Casters for immediate delivery. He and one of the strategically located Faultless Sales Engineers are available to work with you on every handling problem in your plant. Both are listed in the Yellow Pages, under "Casters," beneath the Faultless heading.

WRITE FOR FREE CATALOG

Faultless Caster Corporation EVANSVILLE 7, INDIANA

Send copy of 20 page condensed Caster catalog 157G, no obligation

Name_____

Firm_____

Address_____

City_____ State_____

For more facts circle 626 on Reply Card

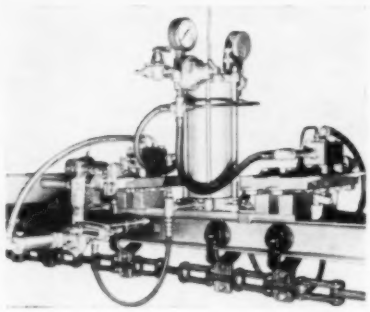
NEW PRODUCTS

(Begins on page 176)

design features: a Z-shaped body which creates a controlled turbulence to keep particles in suspension, and a diamond-shaped port to prevent plugging at small valve openings. Suggested for flow control of pulp stock and other slurries, the valve is offered with iron or stainless steel body, both having stainless steel gate and stem. Six connection sizes available range from 3 to 12 in. with flat face ASA flange drilling. Fischer & Porter Co.

41—TROLLEY WHEEL LUBRICATOR works automatically

This air-actuated, automatic trolley wheel lubricator is designed to lubricate every wheel on both sides of the track without stopping the production line. Just open the air valve and air-energized couplers engage the passing trolley wheels to deliver

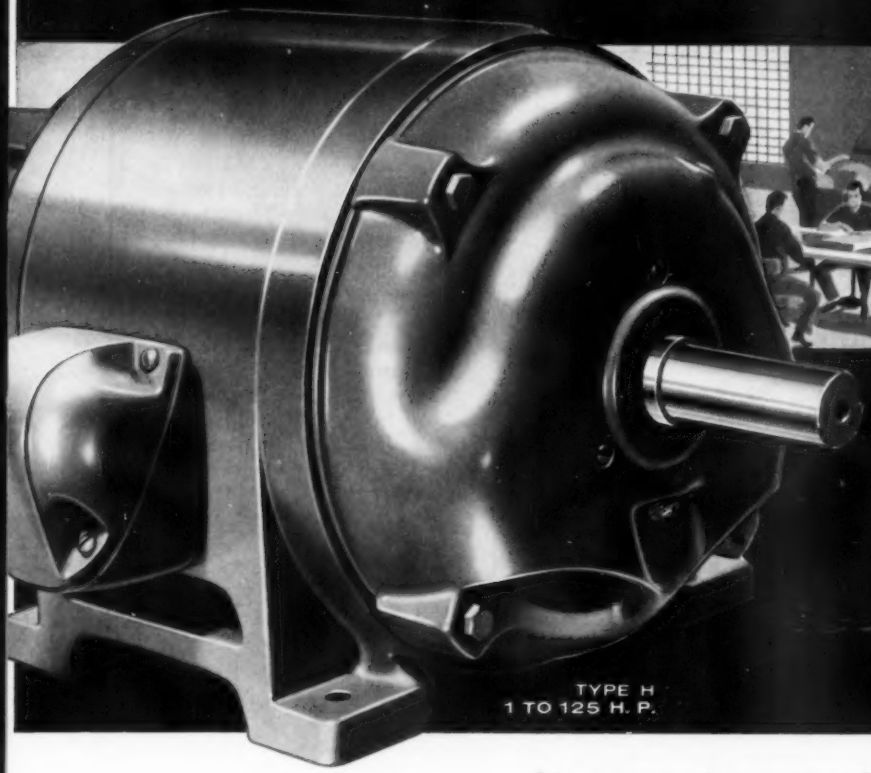


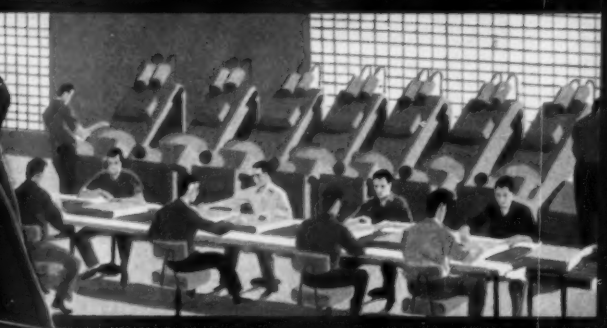
a measured amount of lubricant to each wheel. Wheels can be spaced yards apart, can be irregular in spacing, or as close as 6 in. on centers. Mounted on a steel plate, the complete unit may be installed on existing overhead conveyors with 3-, 4-, or 6-in. I-beam. It may be welded or bolted to the top of conveyor track beam without disassembly of system. If bolt mounted, lubricator may be used as a portable unit and shifted from one conveyor to another of like size. Reservoir contains 25,000 shots of oil or grease Alemite Div., Stewart-Warner Corp.

42—CHEMICAL FEEDER and water treatment regulator

Hydrotrol is announced for the control of rust, scale, corrosion, slime and algae in recirculating cooling water systems for air conditioning, refrigeration and process cooling. Hydrotrol functions not only as a chemical feeder, but also as a treatment regulator designed to auto-

production shutdowns cost more than motors!





dependable U.S. motors *prevent shutdowns!*

...it pays to specify

U.S. Uniclosed Motors

Because production shutdowns *cost far more than motors,* real economy lies in buying motors of *quality* you can depend on! U.S. UNICLOSED is the motor choice for normal production needs. U.S. UNICLOSED MOTORS give you the quality and dependability that are built into every U.S. motor—plus protection *far* superior to ordinary dripproof motors. Only U.S. protects all windings with nature's non-organic, non-carbonizing insulation—asbestos! This prevents costly burn-outs. Unlike ordinary makes, U.S. motors have shock-resistant, corrosion-resistant cast iron frames that are *normalized*—heat-seasoned to prevent warp! To protect bearings, U.S. LUBRIFLUSH transverse lubrication purges old grease. This minimizes lubrication and maintenance requirements. These and many other factors add up to U.S. *quality*—the kind you can depend upon to keep production lines running! U.S. UNICLOSED 3-phase AC motors are available in RATINGS ¼ to 250 H.P. It pays to specify: "U.S. MOTORS."

U.S. ELECTRICAL MOTORS INC.

BOX 2058, LOS ANGELES 54, CALIFORNIA
OR MILFORD, CONNECTICUT

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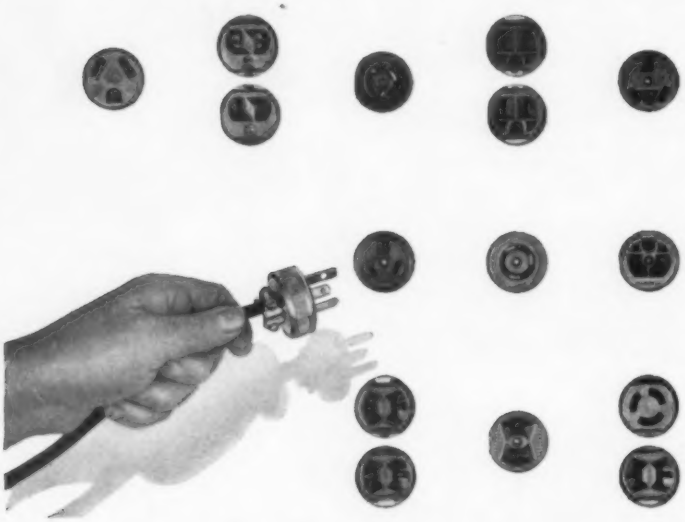
FREE COLOR-ILLUSTRATED BROCHURE
For detailed data on Uniclosed Motors, write for Uniclosed Bulletin No. F-1856

INDIVIDUAL PROTECTION STATIONS



SAFELETS

now available with a wide variety of receptacles and circuit breaker ratings

The Heinemann Safelet is a compact unit that neatly combines circuit-breaker safety with plug-in convenience. It has hundreds of applications, can be used for the individual protection of power tools, fractional horsepower motors and almost all general appliances.

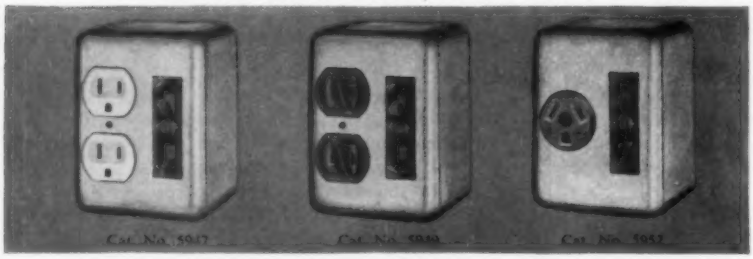
Now you can have the Safelet with any of a large number of receptacles, single and duplex, in twist-lock, polarized, "T" slot and other styles.

And now you can have a wide choice of circuit breaker ratings: from 6 to 50 amperes, at the most commonly used a-c and d-c voltages.

The Safelet enclosure is made of 16-gauge steel with an attractive grey hammertone finish. Units are available for either flush or surface mounting.

Of course, the circuit breakers used are Heinemann breakers . . . long accepted by the electrical industry as the standard of performance.

For full details, send for Bulletin 1000.



HEINEMANN

ELECTRIC COMPANY

128 Plum Street Trenton 2, N. J.

S.A. 1689

For more facts circle 628 on Reply Card

NEW PRODUCTS

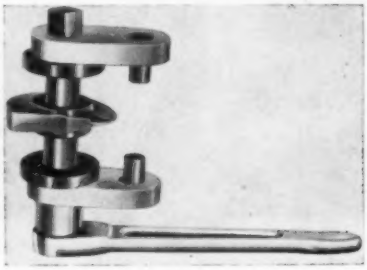
(Begins on page 176)

matically and continuously synchronize rate of chemical feed and water bleed-off with load on system or amount of water evaporated, so as to maintain treatment without "drift" over relatively long periods of time. According to manufacturer, Hydrotrol saves 95 per cent of the labor required for service analysis and adjustments, an average of 50 per cent on chemicals for air conditioning. Heller Laboratories, Inc.

It's easy to obtain product data with the postage-free Reader Service Cards provided on pages 221-222. Use them for information on advertised products, too. Just circle the key number appearing at bottom of the ad.

43—SPREADING TOOL for flanged pipe connections

With Safety Boy, flanges can be spread safer, faster and more economically, it is announced. A feature is a circular cam wedge. This, plus the use of a ratchet handle,



provides a lightweight, handy-to-carry tool that will spread a flange in seconds, says manufacturer. Operation is simple. After flange bolts are loosened and necessary bolts removed, the tool is anchored onto flanges by insertion of pins into flange bolt holes, while at the same time inserting tapered edge of circular cam wedge into small opening between flanges. Pressure applied by ratchet handle spreads flange connection. Wm. L. Riggs Co.

44—ELECTRICAL TAPE offers superior strength

Scotch Brand Tape 55 is announced as a Class B pressure-sensitive electrical tape combining mechanical strength of a non-woven polyester web with electrical properties of a

ECON dual-element cartridge fuses combine

EXTRA PROTECTION

with "QUICK as a WINK" ACTION!

ECON® takes harmless overloads up to 500%

ECON keeps fuse costs and down-time to a minimum by its exclusive Econ-Alloy thermal element. When current overload is continued beyond the "danger point" Econ-Alloy breaks the circuit by changing directly from solid to liquid. The usual plastic stage is eliminated. You get **Extra protection** with "quick as a wink" action.

ECON SAVES YOU MONEY BY

- Stopping needless fuse blows
- Protecting motors and branch circuits instantly
- Keeping machine down-time to a minimum

✻ Fast short circuit protection

Frequent surges of power can be costly and damaging unless they are properly controlled . . . ECON dual-element cartridge fuses are expressly designed for just these applications. The exclusive Econ-Alloy thermal element actually acts like a stop watch on overloads—up to 500%. Economy's precision engineered link construction gives positive short circuit protection. ECON is available in knife and ferrule types; 0 to 600 amperes; 250 and 600 volts. Approved by Underwriters' Laboratories.

WRITE for ECON dual-element Catalog S-60 . . . Literature also available on the complete Economy line of plus value fuses.

ECONOMY FUSES FOR EVERY PURPOSE

ECONOMY FUSE & MFG. CO., 2717 Greenview Ave., Chicago 14, Illinois

Ask your ELECTRICAL WHOLESALER for ECON Dual-Element and other Economy Fuses.

For more facts circle 629 on Reply Card

(Begins on page 176)

polyester film. It consists of a non-woven polyester fiber laminated to a polyester film and coated with a thermosetting, pressure-sensitive adhesive. It is for use in splicing lead wire connections, for lead saddles and pads, strapping, coil covers, interlayer insulation, slot edging and other Class B applications. It is reported particularly suited for uses requiring maximum tear strength and excellent physical strength. It is non-corrosive and suggested for use in fine wire applications. It comes in rolls, 72 yd long, in widths of ¼ in. and up. Minnesota Mining & Mfg. Co.

45—COATING repairs and restores rotted sills

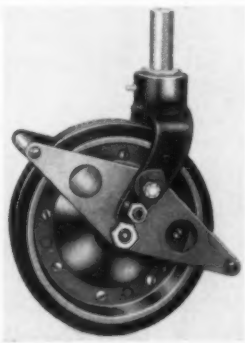
Uses announced for Magna-Bond Putty X range from restoration of even badly rotted window sills to spot repair of metal surfaces, such as oil storage tanks. Sills repaired and painted over with Magna-Bond

Putty X look like and have the permanent qualities of window sills of aluminum, according to manufacturer. This metallic-vinyl coating is claimed impervious to moisture, water, salt water, most acids, petroleum products, soaps and detergents, sunlight and weather. It is first applied by brush or trowel to fill and level off deep holes and rotted-out areas. Then, after thinning with suitable solvent, it is brushed or sprayed on.

When dried, this product is non-toxic, non-flammable, odorless and tasteless, company announced; also it is a non-conductor of electricity, will not rust or oxidize, has excellent impact resistance, high specific adhesion and cohesion, and abrasion resistance. Manufacturer says it can be machined and drilled like metal, stands dry temperatures to 300 F, and immerse temperatures to 200 F. Magna-Bond, Inc.

46—BRAKE-TYPE CASTER is cadmium-plated

This cadmium-plated, non-corrosive brake-type caster is designed for scaffolding, heavy work tables and jigs which must be portable and yet be kept from rolling. The cadmium



plating process affords protection against corrosion, says manufacturer, also, this protective plating on caster wheel and brake prevents rust in these parts. The improved finish also

"A Few Hours Ago That Partitioning Wasn't There!"

Talk about *versatility!* You can use Phoenix Wire Mesh Partitions most anywhere . . . around general stores, stock rooms and tool rooms, or for departmental divisions, corridors and restricted areas. What's more, you can relocate Phoenix partitions as often as required by changes in plant layout. For they can quickly, easily be disassembled and reinstalled . . . oftentimes in a matter of hours . . . by a small crew of your own men.

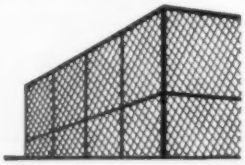
Wire mesh partitioning offers other important advantages, too. It's ideal where lighting conditions and the free flow of air must be considered . . . perfect where unit air conditioners or heaters are in use. They don't interfere with vision or sound . . . they don't obstruct fire extinguishing systems, either. It's the right answer in fact, to all partitioning problems . . . so write today for Bulletin #58.

SINCE 1885 ONE OF THE NATION'S LEADING MANUFACTURERS OF WOVEN WIRE PRODUCTS

PHOENIX WIRE WORKS, INC.

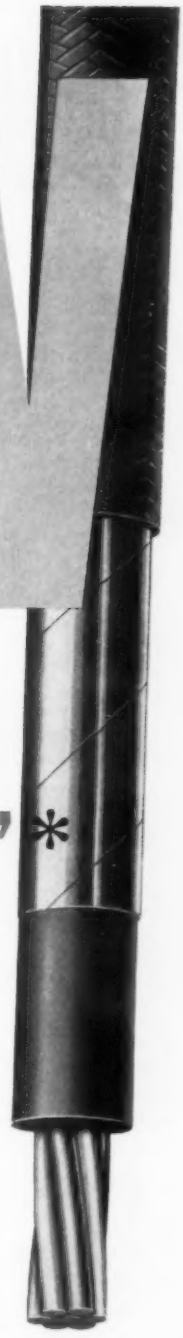
1958 E. KIRBY • DETROIT 11, MICHIGAN

Telephone: WAlnut 2-4520



For more facts circle 630 on Reply Card

NOW



National Electric building wire protected with "MYLAR"*

Now National Electric building wire and cable is protected with a polyester tape of "Mylar" film. It's the first to be listed by Underwriters' Laboratories, Inc. "Mylar" replaces the inner cotton braid on cables No. 6 AWG through No. 2 AWG and the rubber-filled cotton tape on size No. 1 AWG and larger of types RHRW, RHW and RHH building wires and cables.

National Electric Products Corp.

PITTSBURGH 22, PENNSYLVANIA

SALES OFFICES LISTED UNDER

Bennett Associates, Inc.

Sales Offices and Warehouses in Principal Cities

Here are the mechanical and electrical properties that make "Mylar" highly desirable as a component of the cables protective covering—

1. High tensile strength and resistance to flexing, pinching and bending.

	Rubber-filled Tape	"Mylar" Tape
Average tensile strength (unaged).....	3253 psi	12800 psi
After 20 hours in air bomb @ 127°C...	2140 psi	13866 psi
After 168 hours in oxygen bomb @ 80°C	2303 psi	13870 psi
Percent gain in weight after 12 hours immersion in distilled water @ 21°C	32.11%	0.67%

2. The finished product has four times the abrasion resistance of rubber-filled tape and braid.
3. High dielectric strength that imparts a plus safety factor.
4. High resistance to acids, alkalies, moisture and atmospheric oxidation.

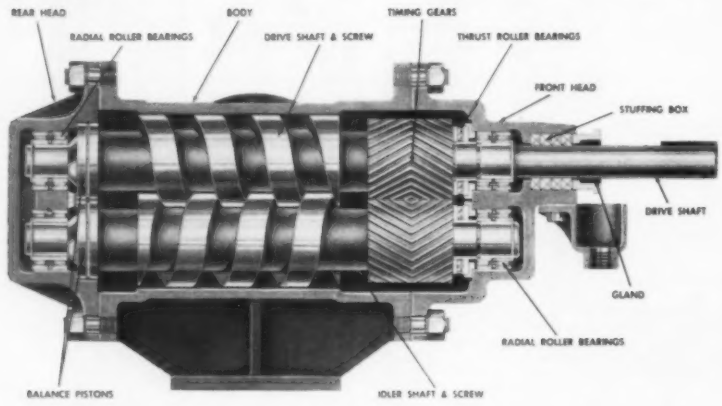
Contact your National Electric distributor today. Get the extra value of building wire protected with "Mylar" film.

Don't say any wire—say NE Wire

*"Mylar" is Dupont's registered trademark for the toughest plastic film ever made with dielectric strength of 4,000 volts per mil.

For more facts circle 631 on Reply Card

SIMPLICITY lowers the cost of this WARREN TWIN SCREW PUMP

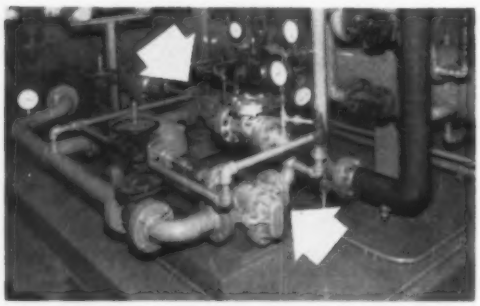


Here's an inside view of a high-speed screw pump that will do the work of other top quality rotary pumps costing twice as much!

Notice the simple construction of this Warren Twin Screw Pump, and the minimum number of parts. The compactness means low initial cost . . . and because no special foundation is needed, installation costs are minimized. No modification is required for vertical operation where floor space is extremely limited, or where the driver must be elevated to prevent flooding.

Maintenance of this efficient type TS pump is also economical. By removing the rear head only, rotating elements can be withdrawn *without disturbing the piping or motor,* and repair parts *that need no field machining* can be shipped immediately from stock.

Four sizes of type TS Screw Pumps are available for capacities to 550 GPM and discharge pressures to 350 PSI over a wide viscosity range. They are particularly suited for *fuel oil services* and other heavy duty oil services requiring a constant, pulseless flow. An ideal application is pictured below.



Two Warren Type 337TS Twin Screw Pumps on *fuel oil burner service* are shown in this installation at the Holyoke, Mass. Gas & Electric Department Plant.

WRITE FOR BULLETIN 255

for more detailed information about the TS Screw Pump that does the job for about one-half the cost.

WARREN

CENTRIFUGAL · SCREW · RECIPROCATING · ROTEX

WARREN PUMPS, INC.

WARREN, MASSACHUSETTS

P-37

For more facts circle 632 on Reply Card

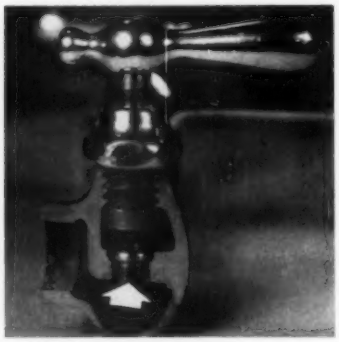
NEW PRODUCTS

(Begins on page 176)

makes caster adaptable for outdoor use and in areas of high humidity. Caster is available in both 5- and 8-in. wheels. Replaceable rubber tire steel disc and cushion tread wheels are obtainable. Load capacity ranges from 300 to 500 lb. The Colson Corp.

47—FAUCET SEAT designed for longer service

Made of R Monel machinable grade nickel-copper alloy, this removable faucet seat, called a Full-Saddle Seat, reduces corrosion and maintenance, company says, and is highly

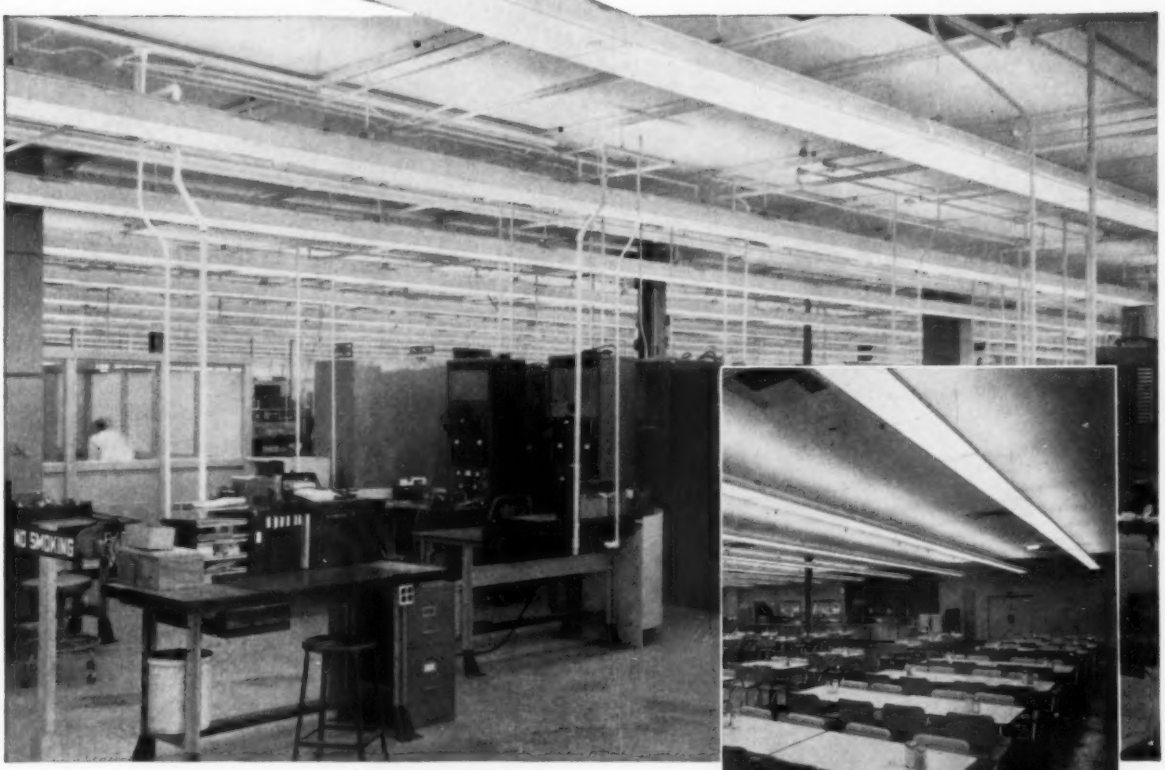


resistant to abrasion and erosion. Features which improve service and prolong life, not only of the seat, but also of the washer and fixture include a seat contour which provides maximum size with least possible waste of material and unused space while permitting maximum water flow, larger smooth seating area; minimized wear on threads of faucet, faucet stem and washer; and curved path for water flow, to prevent noise. J. A. Sexauer Mfg. Co.

48—BLOWERS permit precise air volume regulation

Guesswork as to the quantity of delivered gas or air is claimed eliminated by the 400 Series of rotary positive pressure blowers. Designed for heavy duty continuous service, units can be precisely regulated for varying air volumes simply by changing blower speeds. Operating at a constant speed against a constant pressure, blower always delivers a constant volume of air. Increasing blower speed against constant pressure increases air volume by an amount equal to blower's displacement times the increased number of revolutions. Blower speed is increased by means of pulley changes or variable speed drive adjustment.

Day-Brite CFI® Industrial Fixtures



ABOVE: Day-Brite CFI-25L fixtures furnish 100 footcandles at work level at United Air Lines' Maintenance Base in San Francisco. H. J. BRUNNIER, *Structural Engineer;* LYLE E. PATTON, *Consulting Electrical Engineer;* EMIL J. WEBER ELECTRIC CO., *Electrical Contractor. RIGHT:* United provides glare-free illumination during mealtimes, too, with Day-Brite CFI-25L fixtures in employees' cafeteria.

...help stop troubles before they start

Periodic inspection of precision aircraft instruments allows no margin for error. That's why United Air Lines selected Day-Brite CFI (Comfort For Industry) fixtures for their San Francisco Maintenance Base.

UNITED AIR LINES

Day-Brite industrial fixtures set the quality standards for the lighting industry. In a side-by-side comparison with *any* competitive fixtures, you can see why Day-Brite is the logical choice wherever lighting performance and efficiency are important. Want to see for yourself? Your Day-Brite representative will be happy to arrange a "Table-Top Test" in your office. Call him . . . he's listed in the Yellow Pages.

DECIDEDLY BETTER
DAY-BRITE
LIGHTING FIXTURES

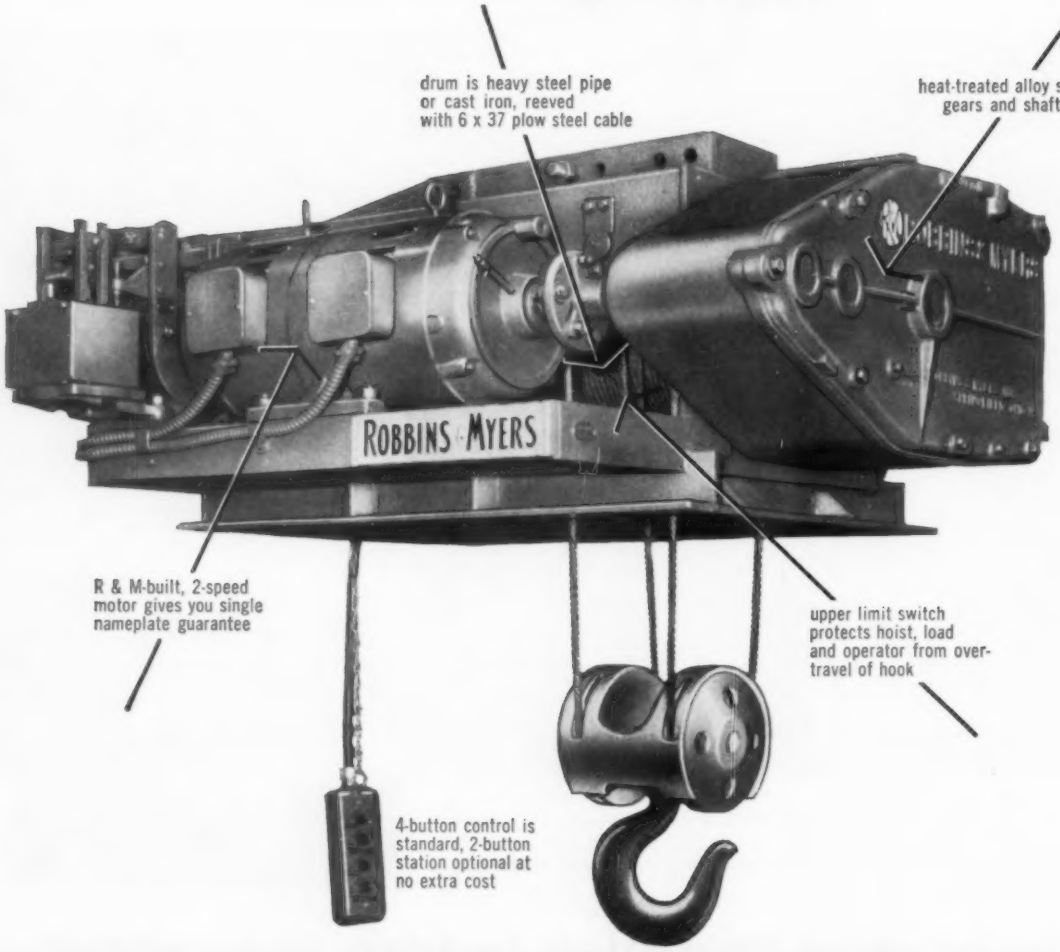
Day-Brite Lighting, Inc., 6242 N. Broadway, St. Louis 15, Mo.
Day-Brite Lighting, Inc., of Calif., 530 Martin Ave., Santa Clara, Calif.

Z-316 ©1958

NATION'S LARGEST MANUFACTURER OF COMMERCIAL AND INDUSTRIAL LIGHTING EQUIPMENT

For more facts circle 633 on Reply Card

dual-duty hoist


drum is heavy steel pipe or cast iron, reeved with 6 x 37 plow steel cable
heat-treated alloy steel gears and shafts
ROBBINS MYERS
R & M-built, 2-speed motor gives you single nameplate guarantee
upper limit switch protects hoist, load and operator from over-travel of hook
4-button control is standard, 2-button station optional at no extra cost

R&M Dual-Duty two speed hoists keep any load under complete control. They furnish the perfect, steady speed combination you need for gentle, accurate spotting of dies, cores, patterns and other delicate loads; and they give you the fast-action lifting you want for high speed production. Their simple, dependable squirrel cage motor eliminates the uncertain speed-load characteristics and maintenance problems of the slip-ring motors used on most conventional multi-speed hoists. With R & M you can select from industry's widest job-proved line: 5 frame sizes, 25 speed-load combinations.

Capacities: ½ to 10 tons. Controls: 2 or 4 pushbutton. Mounting: lug or hook; plain, geared or motorized trolleys. *Robbins & Myers, Inc., Hoist & Crane Div., Springfield, O.*

take it up with

ROBBINS & MYERS

holists cranes

Request Bulletin 880

For more facts circle 634 on Reply Card

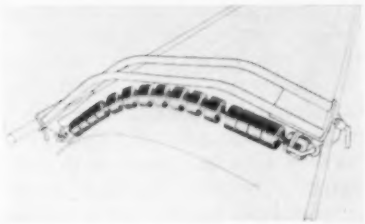
NEW PRODUCTS

(Begins on page 176)

Blowers deliver air volume up to 13,000 cfm and pressures to 10 psi and are available in 30 sizes ranging from displacements of 1-½ to 40 cu ft. For higher pressures, double staging is suggested. Sutorbilt Corp.

49—BELT CONVEYORS for bulk materials handling

Instead of rigid support framing, Limberope Belt Conveyors utilize flexible Limberoller idlers suspended between parallel stringers of steel wire rope. Resulting advantages, according to manufacturer, are lower costs, simple installation and reduced maintenance. The whole system has



fewer parts than many belt conveyors and is lighter—easy to relocate or extend. Although assembly characteristics may differ with each installation, the conveyor usually consists of two parallel strands of wire rope stretched between widely separated anchor points. Rigid strands with integral return idlers support the ropes every 12 to 40 ft, depending on load. Carrying idlers are swivel mounted in rigid brackets and slung between ropes. The idler consists of a series of Neoprene discs molded to a Neoprene covered cable suspended in a catenary between sealed bearings. The belt is supported in a natural arc. Idlers are free to flex and swivel, conforming to the load. Bulletin NR-6C gives information. Joy Mfg. Co.

50—GROUT, MORTAR in ready-to-use form

Non-shrink Embeco, in use for 30 yr, is now available in ready-to-use form. One of the formulations, Embeco Pre-Mixed Grout, is for grouting of machinery and equipment, anchor bolts, columns, bearing plates and bridge seats. Embeco Pre-Mixed Mortar is for patching horizontal and vertical concrete surfaces, caulking seam between floor slab and wall, grouting around pipes through walls, caulking pipe joints and repairing joints of brick and tile floors. According to manufacturer these are superior to plain sand and cement mixes in that they do not shrink on hardening, produce higher compressive and impact-resistant strength, are oil- and water-resistant. The Master Builders Co.

51—DRAIN FITTINGS of corrosive resistant glass

Eight types of corrosive-resistant glass drainline fittings have been added to the Pyrex Brand Double Tough line of pipe. Sizes range from 1½ to 6 in. Those available from stock include T branches and reducers; T double branches and reducers; combination Y and ⅛ bends and reducers; double branch combination Y and ⅛ bends and reducers; Y double branches and reducers; double quarter bends; upright Y or H fittings and reducers (also used as vent branches), and off-sets. The heat-resistant glass handles temperatures to 450 F, it is announced, and records the lowest thermal expansion rate of drainline materials. Good heat shock resistance is also reported, permitting cleaning with low pressure steam. The glass is resistant to most corrosives, according to manufacturer, is affected only by hyrdofluoric acid, hot alkalis. Corning Glass Works.

Illustrated—Logan Model 400 RFL Unit

Look to Logan

the ultimate in air circuit accessories

Logan RFL Unit, the designers choice for over a decade! Protects your air-powered equipment . . . regulates pressure . . . filters air . . . lubricates air. Adds years of dependable performance.

New Model 400, illustrated above, is a companion model to the well-known Model 600.

FREE SEND FOR THE "LOGAN CALCULATOR"

MEMBER: Natl. Mach. Tool Builders' Assn.; Natl. Fluid Power Assn.

LOGANSPORT MACHINE CO., INC.
838 CENTER AVENUE, LOGANSPORT, INDIANA

PLEASE SEND COPY OF CATALOG:

- ☐ 100-1 AIR CYLINDERS
- ☐ 100-2 MILL-TYPE AIR CYLS.
- ☐ 100-3 AIR-DRAULIC CYLS.
- ☐ 100-4 AIR VALVES
- ☐ 100-5 LOGANSQUARE CYLINDERS
- ☐ 100-5-T ULTRAMATION CYLINDERS
- ☐ 51 PRESSES
- ☐ FACTS OF LIFE
- ☐ 62 SURE-FLOW PUMPS
- ☐ 200-1 HYD. POWER UNITS
- ☐ 200-2 ROTOCAST HYD. CYLINDERS
- ☐ 200-3 750 SERIES HYD. CYLINDERS
- ☐ 200-4 and 200-7 HYD. VALVES
- ☐ 200-6 SUPER-MATIC CYLS.
- ☐ 70-1 CHUCKS
- ☐ ABC BOOKLET
- ☐ CIRCUIT RIDER

TO:

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

For more facts circle 635 on Reply Card

Plan Food Services

(Continued from page 120)

Terrazzo is a highly successful and recommended flooring for the modern cafeteria, dining, or seating area; and while it is costly, it is very easily maintained. Further, it ties in well with any decorating scheme because of the variety of color combinations possible.

For high volume traffic and long life, terrazzo is the best flooring material available and should be included in your specifications if you are concerned about your annual maintenance expense.

This is where your professional food facilities equipment engineer will "pay his freight." In the drawing of his specifications to tie into the approved layout plan, his experienced exposure to the intricacies of food service operations will reflect in the detail written into his general and item specifications. The proper equipment sized to do its specific job and integrated into complete equipment layout is no small order.

Custom fabricated items of equipment such as cafeteria counters, work tables, sinks, shelves, and the equipment in the dishwashing section will be specified so as to reflect a uniform and integrated appearance. The standard "buy out" items, such as ranges, broilers, fryers, steam kettles, powered mixers, slicers, saws, and dishwashers must also become integral parts of the whole. Extreme care in the proper selection of these "buy out" items must be exercised to insure a cohesive operational package.

Powered equipment should be purchased from manufacturers who give the best service on both maintenance and repair parts. Several of the full-line food service equipment manufacturers maintain service branches in all major cities in the country.

In actual practice refrigeration is generally "thrown into" the kitchen equipment contract on a food service project. This practice results in many a maintenance problem because unless professional knowledge is applied to this important phase of food service, ineffective refrigeration is the end product. Undersized compressor coils, and other components of the refrigeration systems present the plant engineer with an unnecessary maintenance problem from the first time the switch is thrown until an adequately-sized system is installed—which may be many maintenance dollars later.

A qualified food facilities equipment engineer knows that "satisfaction guaranteed" comes from writing careful specifications in collaboration with a refrigerator manufacturer and a competent refrigeration engineer. **End**

MUELLER BRASS CO. **PVC**

(POLYVINYL CHLORIDE)

RIGID PLASTIC PIPE AND FITTINGS

for dependable, low cost chemical handling and industrial piping

CORROSION RESISTANT PVC pipe and fittings are immune to the corrosive action of most acids, alkalies, liquids and gases. The smooth interior walls minimize the build-up of deposits, assuring unrestricted flow.

DURABLE AND DIMENSIONALLY STABLE PVC has high tensile strength and the durability to withstand heavy shock loads, vibrations and rough handling. Dimensional stability is excellent under stress, impact and moderately high temperature.

ECONOMICAL MUELLER BRASS CO. PVC products provide a low-cost solution to corrosion problems . . . lightweight for fast, easy handling . . . rugged, long wearing, no need for frequent replacement. Either threaded or solvent cemented piping systems can be readily installed.

Write today for your free samples

C-103

NORMAL IMPACT PVC — good impact strength . . . maximum chemical resistance

HIGH IMPACT PVC — maximum impact strength . . . high chemical resistance

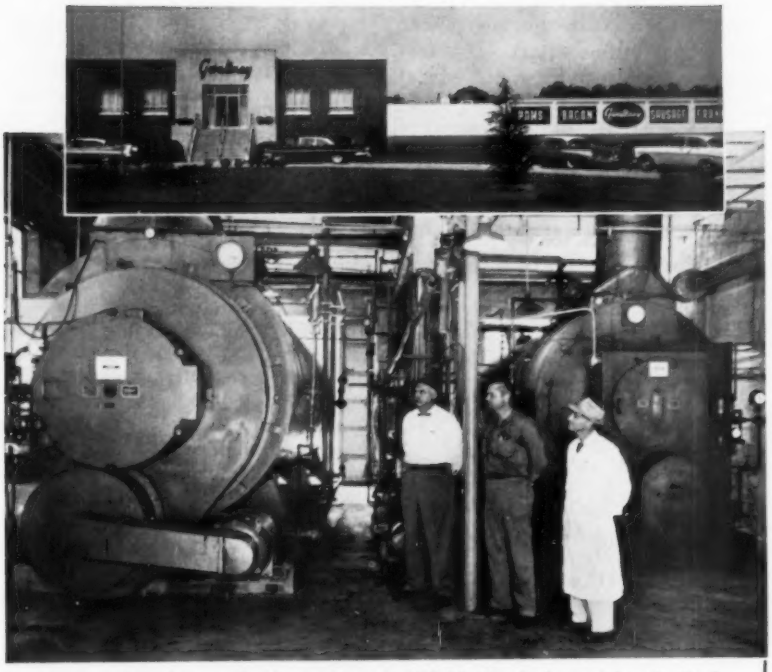
Pipe is fabricated in 20′ lengths; ½″ through 3″ sizes — I.P.S. schedules 40 and 80. Fittings are available in ½″ through 3″ sizes; threaded and socket-type for schedule 80 and in socket-type only for schedule 40.

MUELLER BRASS CO. PORT HURON 50, MICH.

Polyethylene pipe and plastic fittings, copper tube, valves and fittings

For more facts circle 636 on Reply Card

"All right, so I got caught napping under a load of steel."



Continental Boilers at Gwaltney, Inc., Smithfield, Va. Left to right, C. Fred Bailey, Continental Boiler Representative, B. W. Yeoman, Chief Engineer, and J. D. Gwaltney, Vice-President.

STEAM COST CUT
savings up to $7,000 per year

The world's largest processor of genuine Smithfield Hams cut steam costs $7,000 per year with two Continental Boilers – a **400 H.P.** Continental installed in 1953, and a **600 H.P.** unit installed more recently.

Although firing Bunker "C" fuel oil, the cleanliness of operation of these units has made a most favorable impression on the owners and visiting affiliates.

J. D. Gwaltney, Vice-President, Gwaltney, Inc., Smithfield, Va., says: "Our experience and figures show that we are saving $7,000 yearly . . . our cost per pound of steam has decreased to effect this saving, to say nothing of the cleanliness of operation which is an important consideration in a food processing plant."

Continental Boiler users benefit by many outstanding features . . . 80% **EFFICIENCY** – guaranteed by the manufacturer. **REDUCED MAINTENANCE** – a result of simplified construction and maximum accessibility. **ONE-SOURCE RESPONSIBILITY** – a positive assurance of satisfactory performance.

Compare the distinctive features of Continental 2-pass design with "extra-pass" boilers by securing new publication BE-100.

BOILER ENGINEERING & SUPPLY COMPANY, INC.
Phoenixville, Penna.

Continental
AUTOMATIC
BOILER

A HALF CENTURY OF BOILER MANUFACTURING EXPERIENCE

Let your Continental Boiler Specialist Help You

CALIFORNIA
El Cerrito—American Engineering & Mfg. Corp.
Escanido—Pacific Engineering Equip. Co.
Los Angeles—H. B. Brown Company

COLORADO
Englewood—Champion Specialty Co.

CONNECTICUT
Stamford—Arthur C. Beningson

DISTRICT OF COLUMBIA
Washington—Charles C. Plummer

FLORIDA
Jacksonville—H. L. McMurry & Co.
Miami—H. L. McMurry & Co.
Orlando—H. L. McMurry & Co.
Tampa—H. L. McMurry & Co.

GEORGIA
Atlanta—Mechanical Associates
Augusta—Tarte Boiler Repair Co.

ILLINOIS
Chicago—Automatic Steam Sales Co.

INDIANA
Indianapolis—C. C. Schuetz, Inc.
New Albany—Falls Cities Boiler & Machine

IOWA
Waterloo—J. A. Neymeyer Co.

LOUISIANA
New Orleans—Cressy Sales Company

MARYLAND
Baltimore—Heating Services, Inc.
Hagerstown—Hagerstown Equipment Co.
Salisbury—R. D. Grier & Sons Co.

MASSACHUSETTS
Dorchester—Lewis National Corp.

MICHIGAN
Dearborn—Kramer & Associates, Inc.

MINNESOTA
Minneapolis—Oil Burner Service Co., Inc.
St. Paul—Lincoln Equipment, Inc.

MISSISSIPPI
Jackson—Climate Engineers, Inc.

MISSOURI
St. Louis—Continental Boiler & Sheet Iron Works

NEBRASKA
Omaha—Midwest Utility Service Co., Inc.

NEW YORK
Binghamton—Ellis Morse Company
Buffalo—W. J. Clark Equipment Co.
Gloversville—Olin T. Caldwell & Co.
Hudson Falls—Boiler Equipment Co.
New York—Thermal International, Inc.
Rochester—Ernest J. Rookey
Syracuse—U & S Supply Corp.

NORTH CAROLINA
Greensboro—M. G. Newell Co., Inc.

OHIO
Cincinnati—Kenneth B. Little Co.
Cleveland—P. M. Equipment Co.
Columbus—Don Delp Co.
Toledo—Air Conditioning Distributors, Inc.

OKLAHOMA
Oklahoma City—Mecha-Line Co.

PENNSYLVANIA
Phoenixville—Besco Sales, Merrill A. Squier
Pittsburgh—John C. Gregg Company

RHODE ISLAND
Providence—Weatherall Engineers, Inc.

TENNESSEE
Knoxville—Boiler Supply Co.
Memphis—Middle States Associates, Inc.
Nashville—Boiler Supply Co.

TEXAS
Dallas—Rodgers Engineering Co., Inc.
Fort Worth—J. P. Philibert

UTAH
Salt Lake City—Power Engineering Company

VIRGINIA
Lynchburg—Industrial Heating Co.
Suffolk—C. Fred Bailey

WISCONSIN
Milwaukee—Industrial Steam, Inc.

For more facts circle 637 on Reply Card

Two-Way Radio

(Continued from page 97)

station in the shipping and receiving department office. All trucks were placed under jurisdiction of this one department foreman. When the foreman of one of the other departments has need of a vehicle, he merely calls the dispatcher who uses the radio to send the nearest available truck to the job.

This was one experiment that certainly paid off immediately. We found that three radio-equipped trucks could do the work formerly requiring five trucks without radio control. The result is a solution to both main problems. There is now 40 per cent less truck traffic in the aisles and the trucks are productive almost 100 per cent of the time.

With an antenna on the roof of the plant, we get full plant coverage despite the variety of welding machines, electrical equipment and building materials in use throughout the area. The system is licensed in the low power industrial radio service on a frequency assigned by the Federal Communications Commission.

The mobile radiophones are completely interchangeable. In fact, we installed an antenna and shock mounting bracket on one of the spare lift trucks, so that in case a regular vehicle breaks down, we can switch its radio over with no trouble and so remain in full operation. **End**

Dual-Purpose Structure

(Continued from page 115)

suspected, air would be passed through an electronic precipitator type of electrostatic air cleaner to provide chemical, biological and radiological filtration and to remove any radioactive particles which might be present.

The immediate connection to the outside air is a reinforced concrete plenum protected from blast with steel plate louvers at both ends. At the inner end of the chamber, well-shielded from outdoors, the connection is made to the conventional ductwork. The electronic filtration takes place immediately before entrance to the air-handling machine.

To offset probable loss of outside power in an attack, a source of emergency power must be provided. Automatic switching equipment would start up the diesel-powered generating apparatus. The presence of one or more diesel engines would put an additional load on the ventilation system, making a separate exhaust system necessary.

A good example of the integration of a shelter into a plant's building program is the recently built plant of the Cleveland Twist Drill Company in Cleveland, Ohio. A basement planned for this multi-story manufacturing plant was outfitted to provide for an emergency area. The basement area is now used as a locker room, which, although not the optimum, will be practicable for shelter.

In Tulsa, Oklahoma, a reconverted basement in the Jones and Laughlin Supply Company building normally functions as the company's permanent records storage area, but in time of emergency can shelter 600 employees from disaster. **End**

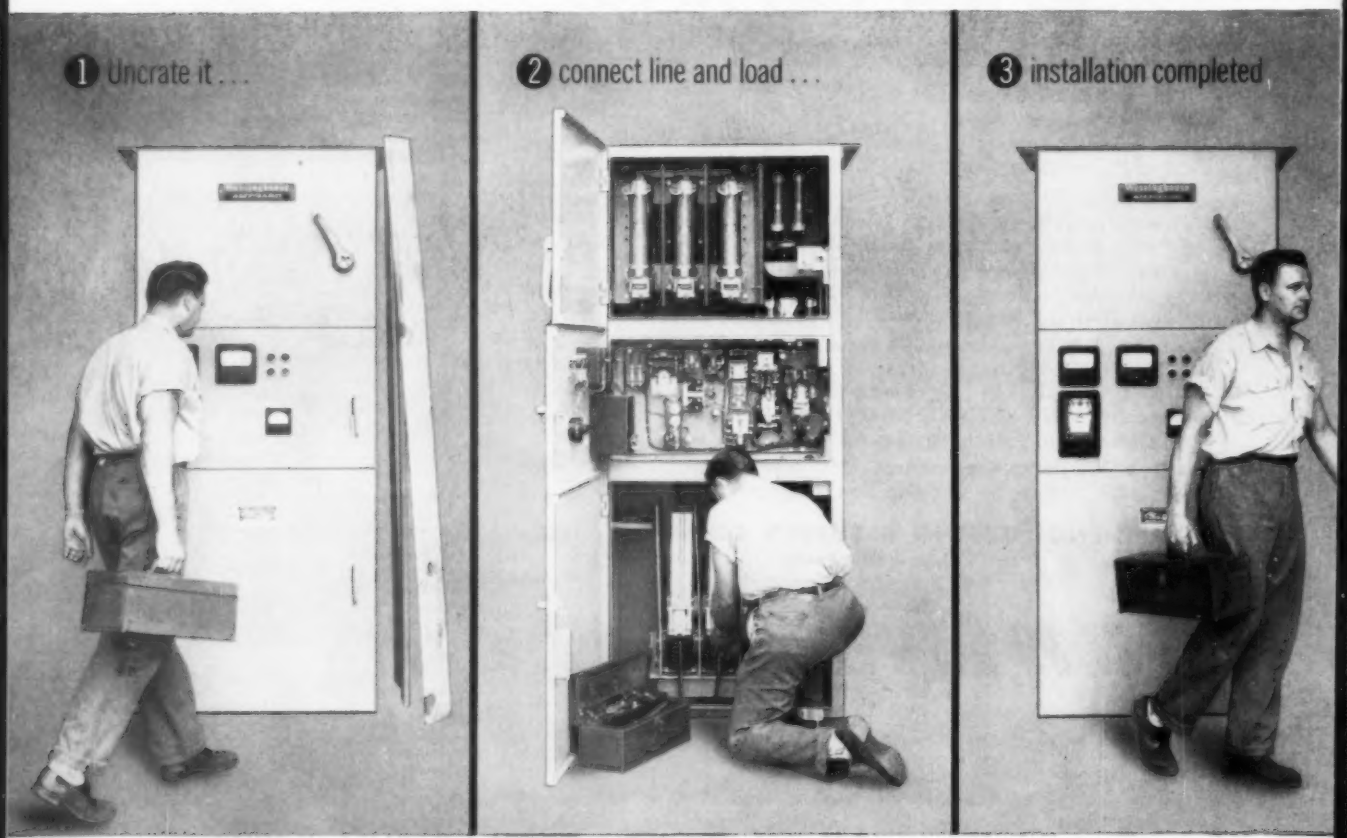


Chart Simplifies Steam Trap Selection

(Continued from page 129)

latent heat of the steam at the trap pressure, Btu per lb) is found by "entering" at 25-psig steam pressure and projecting to the temperature rise of 140 F, (200 — 60). Thus, X = 0.150. "Enter" the chart at the left at a material weight of 2000 lb and project to the right to the specific heat of 1.0.

From the intersection of this line with the central pivot line, draw a line through X = 0.150 on the righthand scale. At the intersection with the condensate scale read the amount of condensate formed as 300 lb in 15 minutes. So in one hour the amount of condensate formed would be 4 (300) = 1200 lb.

The chart is based on the relation: $C = WSX$

C = condensate formed during heating period, lb
W = weight of material heated, lb
S = specific heat of material heated, Btu/lb/deg F
$X = \frac{T\text{-}t}{L}$
T-t = temperature rise of the material heated, deg F
L = latent heat of the heating steam at the trap operating pressure, Btu/lb

You can use this chart for any liquid or solid heated in a pressure vessel or by submerged surfaces, if you know the factors listed above. Where a liquid is to be heated and you know the number of gallons to be handled, simply multiply the total number of gallons heated per unit time by the weight of the liquid in pounds per gallon and then "enter" the lefthand scale with this total weight. Solve as detailed.

The X and specific heat scales have been set up to cover most pressure, temperature and material ranges ordinarily met in practice. So this chart is usable for every ordinary steam heating application in industry.

When any three of the four factors plotted on the chart are known, the fourth can be found:

Example: A heating coil produces 180 lb of condensate when it raises the temperature of a liquid 100 F. How much liquid is being heated if the specific heat is 0.3 and the steam pressure is 200 psig?

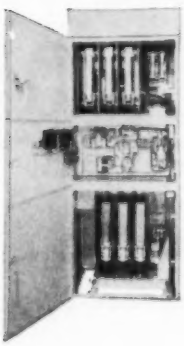
Solution: From the table X = 0.120. "Enter" the chart at the right at X = 0.120 and project through 180 lb on the condensate scale to the pivot line. From this point on the pivot line draw a line through the specific heat of 0.3 on the right and extend it to the left to intersect the weight scale. Read the amount of liquid heated as 5000 lb. Though the solution lines for this problem are not shown, they are easily inserted. Use a transparent straightedge to do this.

Note that the righthand scale carries two values—X and the specific heat. So use care when projecting to see that you choose the correct value. **End**

Westinghouse *AMPGARD* high-voltage starters . . . completely factory wired . . . shipped in one package . . . easily installed

Specify Westinghouse AMPGARD* high-voltage starters and you automatically reduce installation time and expense. Why? . . . Your Westinghouse high-voltage starter arrives completely ready for operation . . . it's all wired, completely assembled and pretested. No need to wire and assemble separate contactor units. Just make the line and load connections and you're in business.

Available for squirrel-cage, wound-rotor and synchronous motors up to 5000 volts, Westinghouse AMPGARD high-voltage starters simplify and reduce future maintenance . . . contactors are completely serviceable without removal from the starter . . . tilt-out arc chutes of Type H stationary contactor permit immediate inspection of all essential parts . . . contacts can be replaced in minutes.



For complete information about new Westinghouse AMPGARD high-voltage starters, contact your nearby Westinghouse representative, or write: Westinghouse Electric Corporation, P.O. Box 868, 3 Gateway Center, Pittsburgh 30, Pennsylvania. J-22138

*Trade-Mark

POWER-UP starts with CONTROL

YOU CAN BE SURE...IF IT'S Westinghouse

For more facts circle 638 on Reply Card

NEW BOOKS

for the plant engineer

Lighting Handbook

WESTINGHOUSE LIGHTING HANDBOOK. Size 7½ by 5¼ in.; 250 pp; illustrated; wire-bound loose leaves. Published by Westinghouse Electric Corporation, Commercial Engineering Department, Lamp Division, Bloomfield, N. J. Price $3.00.

REVISED and brought up to date, the 1958 issue of the Westinghouse Lighting Handbook should be of particular interest to plant engineers. The book has new expanded tables on mercury and fluorescent mercury lamps, additional information on lumen maintenance, new light source selection guide for industrial lighting and lumen depreciation curves on ventilated and non-ventilated fixtures.

There are curves on the effects of the upward light component on performance, new inspection lighting techniques, design data on luminous ceilings and examples of applications of germicidal lamps to duct systems. A brand new cost analysis form is provided for comparing the relative cost of lighting of different systems.

In addition, the manual contains chapters on interior wiring, school and office lighting, store lighting, industrial and architectural lighting, floodlighting design, street and sign lighting, and germicidal and sun lamp data.

LP-Gas Carburetion

LP-GAS CARBURETION SERVICE MANUAL. Size 11 by 8½ in. approx.; paper bound. Published by Beam Products Manufacturing Company, 3040 Rosslyn St., Los Angeles 65, California. Price $1.00.

SERVICING experience, information and questions in thousands of letters, material from manufacturers, trade paper articles, and "trouble shooting" sections of books were contributory factors in the development of this guide.

Some of the subjects treated in this publication, containing twenty sections are: hard starting, freeze-ups and frost, power loss, poor economy, fuel system leaks with engine stopped, and poor idling.

On Heating and Cooling

AIR CONDITIONING AND REFRIGERATION by William H. Severns and Julian R. Fellows. Size 9¼ by 6¼ in., 563 pp including index; illustrated; cloth bound. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Price $10.25.

THIS BOOK BASED on the second edition has been extensively rewritten. The authors have added a chapter on fluid flow and expanded greatly on the treatment of refrigeration. The approach to both air conditioning and refrigeration is balanced and rational. Equations are either developed from known thermodynamic principles or references are given regarding basic explanations.

A complete procedure covering the design of an air washer is an outstanding feature and the only presentation in book form is given for finding the enthalpy of the outdoor air to be used in computing cooling loads when the time of the peak load is other than at 3 o'clock in the afternoon.

Problems on hot-water heating systems, fan-duct systems and all-year air conditioning systems are included along with many helpful and informative illustrations, charts and tables.

Where water is used, process equipment and storage tanks are sure to corrode unless protected by an E.R.P. cathodic protection system. Even with these concrete high rate clarifiers at the St. Regis Paper Company plant near Jacksonville, Florida, it pays to protect the metal parts with an E.R.P. cathodic system.

Engineering PLUS...

E.R.P. cathodic protection pays off in maintenance savings

In industry or public service, water treatment is a big investment. To protect that investment in water treatment equipment could be a tremendous maintenance job. Even with concrete clarifiers, it pays to use E.R.P. cathodic protection. When there are metal tanks involved, just one cleaning and painting can cost more than a complete E.R.P. cathodic protection system.

From preliminary design to continuing periodic corrosion surveys, experienced corrosion engineers measure, analyze and design specifically for your corrosion problems. That is the only way corrosion can be virtually eliminated.

E.R.P. engineering plus prevents corrosion of water storage tanks, water and sewage treatment structures and pipelines. For full information on how E.R.P. can help you save maintenance costs, write for bulletin E-46.72.

ERP CATHODIC PROTECTION SINCE 1935

ELECTRO RUST-PROOFING CORP.

A SUBSIDIARY OF WALLACE & TIERNAN INC.

30 MAIN STREET, BELLEVILLE 9, NEW JERSEY

CABLE: ELECTRO, NEWARK, N. J.

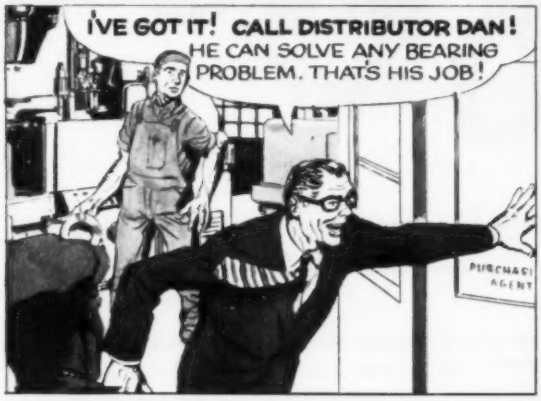
For more facts circle 639 on Reply Card

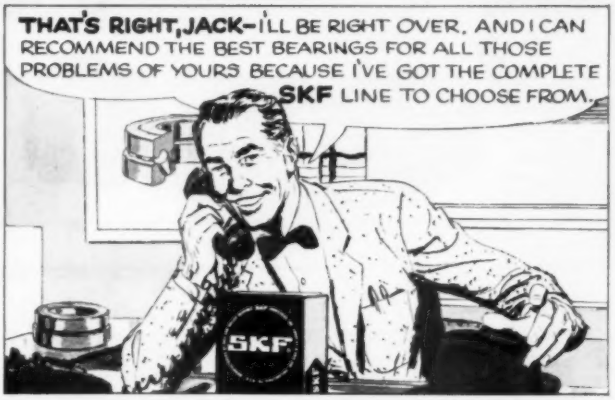
The real life adventures of

DISTRIBUTOR DAN

the SKF bearing man

I'VE GOT A BEARING PROBLEM! IS THERE AN ANTI-FRICTION BEARING THAT'LL TAKE HEAVY THRUST LOADS AT HIGH SPEEDS - ON A VERTICAL SHAFT?
PURCHASING AGENT




THAT'S RIGHT, JACK- I'LL BE RIGHT OVER, AND I CAN RECOMMEND THE BEST BEARINGS FOR ALL THOSE PROBLEMS OF YOURS BECAUSE I'VE GOT THE COMPLETE SKF LINE TO CHOOSE FROM.
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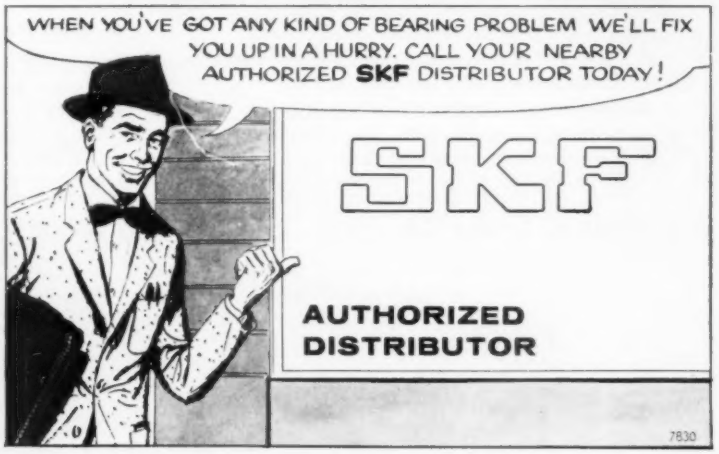
ONLY SKF MAKES ALL 4 KINDS OF BALL AND ROLLER BEARINGS... AND WITH THAT KIND OF VARIETY I CAN KEEP AN OPEN MIND ON JACK'S PROBLEM, AND ON YOURS TOO!


WHEN YOU'VE GOT ANY KIND OF BEARING PROBLEM WE'LL FIX YOU UP IN A HURRY. CALL YOUR NEARBY AUTHORIZED SKF DISTRIBUTOR TODAY!
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Spherical, Cylindrical, Ball, and "Tyson" Tapered Roller Bearings

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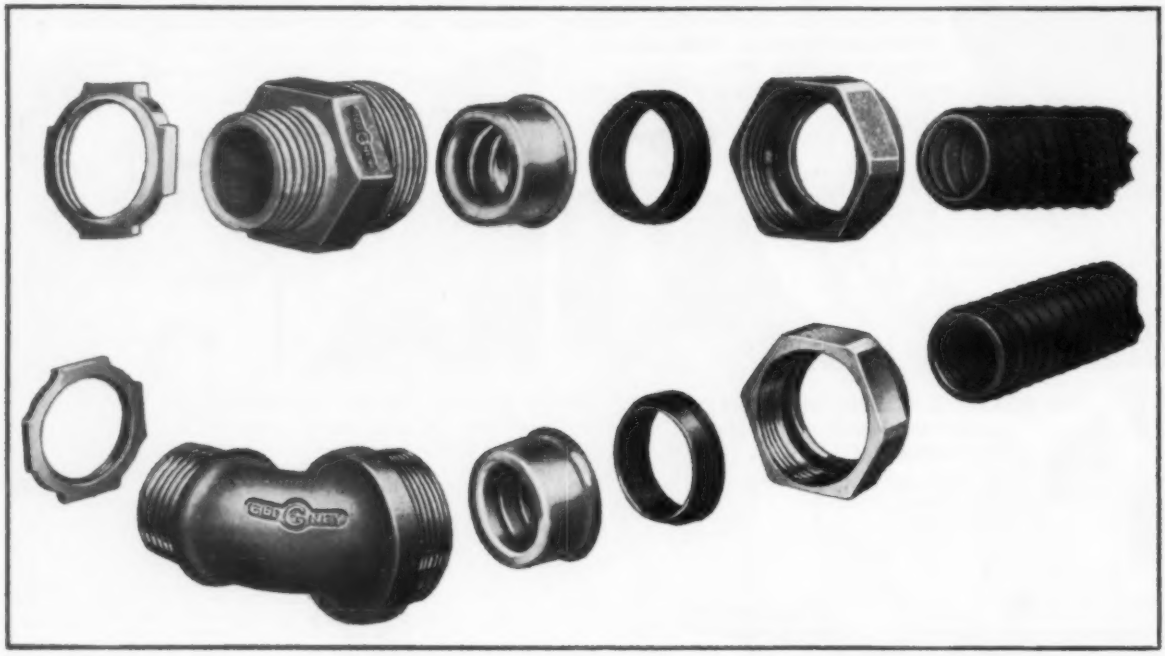
For absolutely Liquid-Tite Connectors specify

GEDNEY— every time!



THESE ARE THE NEWEST, most efficient liquid-tite connectors available today for use with Sealtite* and equivalent liquid-tite conduits. Designed to give wiring installations absolutely dependable protection in these popular oil- and water-tight flexible raceways, Gedney Liquid-Tite Connectors are built for lifetime service.

As shown from left to right in the exploded views above, Gedney Liquid-Tite Connectors consist of:

1. **Locknut—nut stock steel—cadmium-plated**
2. **Main Fitting—straight, 90° angle, or 45° angle—malleable iron—cadmium-plated**
3. **Grounding Bushing—one piece—threaded to engage conduit spiral**
4. **Molded Vinylite sealing ring—pliable—ever-lasting**
5. **Gland Nut—malleable iron—cadmium-plated**

Standard sizes range from ⅛″ to 2″ straight, 45° and 90° . . . order Gedney Liquid-Tite Connectors for top safety and longest life.

* *Sealtite is the trade name of American Metal Hose Branch of the American Brass Company*

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BULLETINS

(Begins on page 21)

145 Low Voltage Breakers — Bulletin GEA-5915, 20 pp, covers operation and application of low voltage power circuit breakers for circuits up to 600 v a-c and 250 v d-c. Stored energy closing mechanism is one of the many product and safety features described. Also included are equipment and application photos, system diagrams, dimensional drawings, rating tables, guide form specifications, and a listing of accessories. General Electric Co.

147 Breakers and Enclosures — This 56-pp 1958 Speedfax catalog contains pricing, dimensional and application information on molded case and large air circuit breakers, as well as general descriptions of switchgear products, Tranfo-units and high voltage switching devices. A central selection chart indicates ratings, overcurrent devices, attachments and modifications available on the individually-enclosed circuit breakers. Application sections, wiring diagrams are included. I-T-E Circuit Breaker Co.

148 Protective Relays — Featured in 16-pp Catalog 5-020 are time delay overcurrent relays, directional inverse time overcurrent relays, differential relays, instantaneous overcurrent relays (adjustable setting), inverse time voltage relays, auxiliary relays, ac-dc definite time relays, and reclosing relays. For each model, tabular data and photos cover its applications, features, design, settings, burdens at 60 cycles, contacts, and case. Federal Pacific Electric Co.

149 Basic Switches — Catalog 62C, 32 pp, covers basic switches, auxiliary actuators and terminal enclosures. Switches described are for use in a-c or d-c commercial and industrial applications. Among switches covered are high-precision roller lever switches, an adjustable actuator switch for convenient fine adjustment, and a pulse switch offering a means of securing electrical impulses without complicated actuating mechanisms. Electrical ratings are given. Micro Switch, Div., Minneapolis-Honeywell Regulator Co.

150 Crane Controls — Two bulletins on a-c and d-c crane control describe master switches, disconnects, limit switches, frequency relays, brakes, and other components of the various crane control systems. Bulletin 6100 is on d-c crane control and Bulletin 6400 is on a-c crane control. Electric Controller and Mfg. Co., Div. Square D Co.

151 Insulated Power Cables — Describes in Bulletin AVA-10 are asbestos varnished cambric insulated power cables for use in high temperature locations. Applications of this group of cables is discussed, and specifications and technical information given on three principal types. Triangle Conduit & Cable Co., Inc.

152 Portable Electrical Cable — Detailed information on portable electrical cable for a variety of industrial applications is presented in this condensed catalog. Basic construction is detailed. Western Insulated Wire Co.

154 Electrical Terminals — Continuous strip electrical terminals and attaching machines are featured in this 16-pp catalog. Describes variety of strip terminals available and includes a number of dimension charts for easy selection. Kent Mfg. Corp.

155 Stationary Batteries — Twelve-pp Bulletin GB-1848 is designed to aid in selecting calcium storage batteries for switch gear, alarm system, telephone control, signalling, emergency lighting and other services where batteries are used for standby power. Discusses suggested use, installation procedures and development of the calcium stationary battery. Tells how to calculate size requirements, and includes engineering specifications. Industrial Div., Gould-National Batteries, Inc.

156 Recording Volt-Ammeter — Bulletin GEA-6821, 16 pp, covers portable and switchboard models, a hook-on recording volt-ammeter and an inkless recorder. Describes in text, pictures and tables, applications, features, accessories and prices. General Electric Co.

METALS

158 Stainless Steel—This 40-pp booklet on use of stainless steel in the chemical industry includes sections on the process industries, the plastics industry, petrochemical industry, detergents manufacturing, nuclear power industry and others. Easy to follow diagrams and photos are included, as well as a comparative table on stainless steels and a table on the corrosion resistance of stainless steels to various media. Allegheny Ludlum Steel Corp.

159 4-D Wrought Iron — Comparative service life of 4-D wrought iron, standard wrought iron and other ferrous metals is given in this 8-pp booklet. Graphically illustrates in-service and laboratory tests conducted with 4-D wrought iron and other metals, and describes what 4-D wrought iron is, and how its corrosion resistance was increased. A. M. Byers Co.

MACHINE SHOP

160 How to Bend Conduit—"Making Conduit Bends that Fit" is a little 8-pp manual detailing steps in fitting rigid conduit or EMT to the job by producing exact stub lengths, back-to-back bends, aligned offsets, etc. Tips on the use of modern benders and simple rules for making accurate measurements are provided. Operations are illustrated by simple sketches, measurement diagrams and tables of shrinkage allowance for saddle bends. The Steelduct Co.

161 Hardsurfacing Electrodes—Bulletin MW-222, 12 pp, outlines data on more than 25 hardsurfacing electrodes and wires. Of particular interest is a checklist of uses—a guide for selecting correct electrode or wire to use on some 400 different types of welding equipment. Welding Products Div., A. O. Smith Corp.

162 Cutting Torches—Form 1174 features a line of cutting torches designed for a variety of flame-cutting jobs. Torches that can be used interchangeably with every fuel gas combination —oxy-acetylene, oxy-propane and oxy-natural gas—are described. Linde Co., Div. Union Carbide Corp.

163 Cutting and Grinding Fluids — Bulletin BK-21, 12 pp, describes cutting and grinding fluids for the metal-working industry, including three oil-type and three water-type lubricant-coolants for virtually every metal-removal need. Machinability rating chart and selection charts are included, as well as data on typical uses, properties, etc. Keystone Lubricating Co.

DUST, FLY ASH CONTROL

164 Cyclone Dust Collector—Bulletin C-958 illustrates and describes design and structural features of high efficiency cyclone dust collectors. Application drawings and illustrations, and a detailed discussion of factors involved in cyclone performance and selection are included. The Ducon Co., Inc.

Reader Service Cards for ordering bulletins are on the facing page. Be sure to include your name, job title, and company, even if you want bulletins mailed to your home address.

165 Fly Ash Collection — How one company has automated fly ash collection and disposal is the subject of this 8-pp illustrated bulletin. Installation of the dust-collecting system, consisting of first-stage cyclones and second-stage electrostatic precipitator, is detailed. Buell Engineering Co., Inc.

REFRACTORIES

166 Refractory Brick — "Refractory Brick and Other Shapes For Industry," 24 pp, has been designed as an aid in selection of proper refractory products for high temperature applications. Includes technical data, tables, graphs, conversion charts and other illustrative material. Norton Co.

167 Insulating Fire Brick — Eight-pp Bulletin IN-115A describes insulating fire brick and Sil-O-Cel insulating brick which can be used for more economical control of heat through 3,000 F. Typical applications are listed, and tables of thermal and physical properties included, as well as other data and illustrative material. Johns-Manville.

168 Refractory Linings — Eight-pp Form 75 describes monolithic linings for full protection of stacks and breechings, utilizing castable refractories. Covers structural and installation advantages of one-piece construction as well as basic advantages of products used. Gives characteristics for five insulating grades of refractory recommended for this service. Plibrico Co.

INSTRUMENTS

169 Variable-Area Flowmeter — Fifteen-page Catalog 10A9010 gives basic engineering data on company's variable-area flowmeter, including tables, graphs,

BULLETINS

(Begins on page 21)

and equations for application, sizing and flow rate calibration prediction of low flow rate rotameters. Float characteristic curves are included. Fischer & Porter Co.

170 For Speed Measurement—A wide selection of speed measuring instruments for applications in all industries is illustrated and described in 20-pp Bulletin 35. Operation details are included, as well as complete specifications, and photos and diagrams. James G. Biddle Co.

171 Miniature Thermocouples — Four basic designs of miniature thermocouples—gasket, bayonet, protected and shielded—are described and illustrated in this 28-pp catalog. Ordering and installation instructions are provided, as well as information on uses and advantages of each type, calibrations and temperature ranges, details of construction, adapters and mounting accessories, thermocouple leads. Thermo Electric Co., Inc.

172 Leak Detectors — Bulletin GEA-6817, 12 pp, describes in text, tables and pictures, the characteristics and applications of leak detectors for any system or component under pressure or vacuum. Special emphasis is given to a new control which can be used with any of the four detector heads. Contains technical data on four models and information on accessory equipment. General Electric Co.

173 Tank Weighing Systems—Twelve-pp Bulletin 581 covers hydraulic tank weighing systems. Shows equipment available to team up with load cells in providing indication, recording, printing and controlling in tank weighing installations. Replete with application drawings, bulletin describes operation of the load cells and the transducing elements used with cells. The A. H. Emery Co.

174 Cabled Tubes—Twelve-pp Bulletin 458 gives complete information on cabled tubes for instruments and controls. Various types of tubing, the protective armor, and types of corrosion-resistant sheaths are covered, and installation instructions included. Crescent Insulated Wire & Cable Co., Inc.

SAFETY

175 Safety Codes — The "F.E.M.A. Handbook of Safety Codes" outlines procedures for maintaining, protecting, recharging, and inspecting fire extinguishing equipment commonly used in industrial plants. Containing 42 pp, the brochure presents both mandatory and recommended procedures to be followed to assure efficient service from portable fire extinguishers, carbon dioxide systems, standpipe and inside hose systems, and fixed foam systems. Fire Equipment Manufacturers' Ass'n, Inc.

176 Emergency Fixtures — Described in this 16-pp catalog are emergency showers and eye wash fixtures providing instant protection against effects of caustics, chemicals, fire, fumes, etc. Illustrated with photos and dimensional drawings, gives operational features of the equipment. Suggestions on installation of emergency showers and eye wash fixtures provided. Speakman Co.

177 Safety Bungs — Bulletin F-17 describes safety bung, designed to protect against the explosion of volatile liquids in drums and storage. Includes application information, cutaway drawings, and engineering data. Jordan Industrial Sales Div., OPW Corp.

OTHER EQUIPMENT

179 Fluid Power Circuits — The 28-pp revised edition of the "Circuit Rider" describes representative types of fluid power circuits and the possibilities afforded by their use. Circuits cover sequencing, semi-automatic and automatic cycling, dual pressure systems, safety systems, skip feed arrangements, and synchronization of two cylinders. Logansport Machine Co., Inc.

180 Dual-Duct Systems—Design, layout and installation data for high velocity dual-duct systems are featured in this 24-pp reference bulletin. Covers construction details for rectangular high pressure ducts, design procedures, as well as basic schemes of air distributing systems, dual duct air handling apparatus, budget costs for such systems, automatic control, winter and intermediate season operation and dual duct construction. Buensod-Stacey, Inc.

181 Statistical Charting — This 16-pp booklet features company's Graph-A-Plan charting materials, lists seven steps to good charting, and outlines various types of charts and graphs generally used in industry. Included are discussions of horizontal and vertical bar charts, line or time series charts, pie charts, and area charts. Labelon Tape Co., Inc.

182 Air Conditioning Unit — Eight-pp Bulletin 870 contains detailed description of components and accessories of company's multi-zone air conditioners, as well as complete capacity and specification data. Construction features are illustrated and described and dimensional diagrams are included. American Air Filter Co., Inc.

183 For Oil Conditioning—Facts about Fil-Thermo-Vac, an oil conditioning system, are given in this 12-pp brochure. The device is designed to remove contaminants for all common oils to 5000 SSU used for lubricating, processing, insulating and food purposes. Tells how the system functions and provides data on sizes and types available, design features. Bowser, Inc.

184 Double Flow Cooling Towers—Special advantages of double flow Aquatowers which combine high efficiency with low silhouette are illustrated and described in this 20-pp bulletin. Various models applicable to different types of installations are pictured and described. Engineering data, drawings showing typical views, and diagrams of construction details are included. The Marley Co.

185 Glass Fabrics — This catalog describes woven glass fabrics impregnated and coated with TFE-fluorocarbon resin. Electrical, mechanical, chemical, thermal and forming properties are discussed and suggested electrical uses detailed. Dielectric strength and weight loss curves are included. E. I. DuPont de Nemours & Co., Inc.

186 Test Plugs, Connectors — Sixteen-pp Bulletin 658 illustrates and describes equipment and methods for sealing openings for pressure testing. The application of test plugs and filling connectors to many different types of openings is detailed. Mechanical Products Corp.

187 Anaerobic Digesters—The anaerobic process in sewage and waste treatment is the subject of 12-pp Bulletin 6700. Featuring diagrams and illustrations, it discusses methods in the treatment of sewage sludge and other organic wastes by digestion, and describes various types of digesters. Infilco Inc.

188 Powder Metallurgy — Sintered bronze bearings and sintered metal parts are described in this 24-pp engineering handbook on powder metallurgy. Advantages of parts made of powdered metal are detailed and various aspects of manufacturing process described. Specifications, a P.V. chart, dimensional tolerances, and other data are included. The Bunting Brass and Bronze Co.

189 For Flexible Automation — Bulletin GED-3684, 8 pp, defines flexible automation as use of numerically-controlled machines to enable economic production of job-lot orders and prototype development. Five steps toward establishing this in a manufacturing plant are suggested. Case histories are cited showing reductions in production time and costs, and increases in accuracies and machine flexibility. General Electric Co.

190 Rubber Products — Applications of rubber products in construction work are detailed in this 8-pp bulletin. Covering various types of hose and conveyor belting, bulletin features information on application, construction, lengths and sizes, and gives working pressures, weights and plies. Hamilton Rubber Mfg. Corp.

191 Drafting Template — Eight-pp Catalog 58 presents company's line of symbol, circle, ellipse, alphabet and other drafting templates. Size, scale, description and uses, and price are shown for each of the 28 different drafting templates and sets. Timely Products Co.

192 Microscopy Needs — Featured in this 10-pp booklet is a line of accessories for microscopy, including such items as grids, tungsten boats, molybdenum apertures, metal wire, viewing screens, and others. Price information is given. Ernest F. Fullam, Inc.

193 Hydrogen Zeolite Softener — Eight-pp Bulletin 4530-A indicates advantages of the hydrogen zeolite process, its chemistry and variations in methods for neutralizing mineral acidity of hydrogen zeolite effluent. Types of zeolites are discussed as well as relative advantages and disadvantages of various regenerants. Cochrane Corp.

to serve your filtration needs better....

COMMERCIAL FILTERS CORPORATION ACQUIRES

Delpark

Now, from one source, you can meet your complete needs for fine filtration through three broad lines — Delpark Filters, Fulflo Filters, and CFC Filters which include Honan-Crane and Michiana models.

To provide more comprehensive service, Commercial Filters Corporation has acquired the Industrial Filtration Company, manufacturers of Delpark Filters. The company will operate as the Delpark Division of Indiana Commercial Filters Corporation, Lebanon, Indiana.

Delpark FILTERS Delpark offers a large selection of filters for coolants, cutting oils, quenching oils, rolling oils, and lubricants — for both heavy and light dirt loads. Products also include a filter for paint spray booth water. Filter media consist of natural or synthetic fibres and metal screens in tubular or leaf form.

Fulflo FILTERS Fulflo Filters, with genuine Honeycomb Filter Tubes in a variety of natural and synthetic fibres, offer true depth filtration to any degree of continuous micro-clarity. Applications include all kinds of oils, fuel, water, chemical solutions, compressed air, CO_2 and other gases. For high or low flow rate, pressure, viscosity.

CFC FILTERS CFC Filters, including Honan-Crane and Michiana models, provide selective filtration of all types of oils — lubricating, coolants, quenching, hydraulic, diesel, etc. Bulk and cartridge type elements. Products also include impregnating oil dehydration units, magnetic separators, automatic tubular conveyors, coolant clarifiers, and settling tanks.

COMMERCIAL FILTERS CORPORATION
MELROSE 76, MASSACHUSETTS
PLANTS IN MELROSE, MASSACHUSETTS AND LEBANON, INDIANA

MICRO-CLARITY AT MINIMUM COST

Fulflo FILTERS — *with genuine Honeycomb Filter Tubes for controlled micro-clarity of industrial fluids.*

CFC FILTERS — *Selective filtration of oils • water-oil separators • magnetic separators • pre-coat filters • coolant clarifiers • automatic tubular conveyors.*

For more facts circle 642 on Reply Card

DATA FILE of literature for the plant engineer's library

STANDARD CATALOGS, bulletins and handbooks are listed to help plant engineers maintain a permanent data file. To get these free catalogs, circle item numbers of those wanted on postage-free cards provided for you on pages 221-222.

LUBRICATION

301 For Better Lubrication—Advantages of company's lubricants which are specially compounded for lubrication of reduction gear drives are outlined in pocket-sized folder. Features which assure smooth, trouble-free gear drive performance and lower maintenance costs are listed. Gulf Oil Corp.

302 Industrial Greases — Described in Technical Bulletin 50 are a group of greases suitable for all types of industrial applications at temperatures from zero to 300 F, in wet, moist or dry surroundings. Sun Oil Co.

303 Lithium Greases — This product information bulletin presents manufacturer's six Litholine industrial greases, stressing industry advantages offered by these multi-purpose greases. Gives properties of the greases, general application and performance characteristics. Sinclair Refining Co.

304 Fundamentals of Wear — Vol. 42, No. 12 of this company's publication, "Lubrication," provides a 12-pp article on function of lubricants in reduction of wear and friction. Deals with phenomena associated with sliding, basic wear processes, interpretation of lube performance. The Texas Co.

305 Plug Valve Lubricants—Reference Book 39—Section 5A, 16 pp, describes company's plug valve lubricants and lubrication accessories. Standard lubricant table gives detailed description and extreme temperature range of each lubricant. Suggested lubricants listed. Homestead Valve Mfg. Co.

306 Lubrication Systems — Bulletin 1450 illustrates and describes a line of lubrication and coolant systems engineered to provide maximum protection to bearing surfaces. A typical mill lubrication system is shown. Dravo Corp.

MECHANICAL POWER TRANSMISSION

307 Magnetic Drives—Data on design, drive features, opening and performance, curves, output torque rating-dimensions, selection chart, as well as photos of installations and applications are included in 6-pp Bulletin W-T 1-57. Whitney Chain Co.

308 Dry Fluid Drive—Illustrated Bulletin A-665 describes the new fhp Flexidyne and coupling, announced as incorporating all advantages found in the larger sizes of this dry fluid drive. Includes tables listing motor and shaft sizes with which they may be used, also starting horsepower ratings for various speeds. Dodge Mfg. Corp.

309 Shaft Mounting Drives—Bulletin 7100, 32 pp, describes all-steel, helical gear, shaft mounted drives for applications in the range from ½ to 50 hp and from 420 to 5 rpm output speed. Covers unit design and construction and provides suggestions on using the drives. Also given is information on how to select proper size and ratio of unit, sheave and belt. The Falk Corp.

310 Internally Geared Power—Featuring latest design improvements in gearmotors and embodying 60 multicolor illustrations, 16-pp Form F-1880 shows comparative advantages of gearmotors, lists ratings from ½ to 30 hp with gear ratios as high as 10:1. Cross-sectional details and enlargements of outstanding features are included. U. S. Electrical Motors Inc.

311 On Drive Selections—Steps in selecting a heavy duty V-belt drive are outlined in 16-pp Bulletin DH-301. Service factor table, design horsepower table, minimum installation allowance table and complete selection tables are included. The Gates Rubber Co.

312 V-Belt Manufacture—Machines and processes used in the production of V-belts are described in 16-pp Booklet S-51106. Rubber compounding, preparation of fabric, building steps, curing and finishing are covered. The Goodyear Tire & Rubber Co.

313 Flexible Couplings — Condensed Engineering Catalog 51-A contains excellent data on the choice and use of company's flexible metal couplings for power transmission. Tells advantages of these couplings and discusses design. Thomas Flexible Coupling Co.

314 Ball Bearing Trolley—Book 2536, 20 pp, describes a ball bearing trolley engineered for overhead conveyors. Features are shown on a large cutaway view and selection tables are included, as well as photos, dimensional diagrams. Link-Belt Co.

315 Permanent Magnet Pulleys—Bulletin 1021 describes a permanent magnet pulley for tramp iron separation in belt conveyor systems, Performance advantages are detailed and a selection chart is included. Stearns Magnetic Products.

316 Cylindrical Roller Bearings—Multi-Row cylindrical roll neck bearings are described in 24-pp Form 436. Contains complete engineering and technical data on cylindrical roller bearings designed for heavy-duty service in roll neck mountings on hot and cold rolling mills. SKF Industries, Inc.

PACKINGS, SEALS

317 Braided Packing — Form AD-131, 8 pp, describes lattice braid packings designed for longer service life and lower maintenance. A table of general recommendations gives essential data, and a table of lengths and weights is included. The Garlock Packing Co.

318 Internal Mechanical Seal—Bulletin CP-575 features Chemical & Power internal seals styles IUA and IUB. They are recommended for use at pressures from 28" Hg vacuum to 100 psi and temperatures from —80 to 500 F. Chemical & Power Products, Inc.

PUMPS, COMPRESSORS

319 Continuous Flow Pump—Bulletin 30-C, 8 pp, outlines advantages of company's Moyno pumps which handle a variety of materials—from free-flowing liquids to non-pourable pastes, abrasives, solids. Describes principle of operation, discusses performance, construction, capacities, and includes specifications. Robbins & Myers, Inc.

320 General Purpose Pumps—Section B, 36 pp, describes rotary pumps for general purpose use. Explains positive displacement principle incorporated, gives suggestions for selecting proper materials of construction. Application and ordering information is provided on mounted and unmounted small pumps, large mounted pumps, pumps for operations requiring greater sealing, and large, totally enclosed models. Viking Pump Co.

321 For Abusive Pumping Jobs—Catalog 5206, 44 pp, covers centrifugal pumps for wide industrial use and especially adapted to handling ashes, abrasive mixtures, slurries, hot and corrosive liquids. It describes several basic types; a horizontal shaft, single-stage end suction pump; a horizontal shaft, single-stage, rear-entrance automatic priming pump; vertical shaft pumps with standard, overhead and quill bearings. Nagle Pumps, Inc.

322 Multi-Stage Pumps—Catalog B-100 describes company's line of vertically split case, multi-stage pumps. Design and construction features are described and performance curves and metallurgical data given. Economy Pump Div., C. H. Wheeler Mfg. Co.

323 Pump Data—Featured in Bulletin 250 are centrifugal pumps, reciprocating pumps, screw pumps and rotex pumps designed for pulp and paper, boiler plants, marine, chemical, food, pipeline, textile and other applications. Typical applications for each pump in the line are listed, as well as range and construction. Warren Pumps, Inc.

324 Vertical Pumps—Bulletin 726.2, 12 pp, describes company's line of heavy duty vertical centrifugal sump and process pumps. Includes specifications, sectional views, performance ratings, and a chart of construction materials for interchangeability. Goulds Pumps, Inc.

325 Compressor Data—Feather valve compressors from 75 to 350 hp are described in 32-pp Bulletin L-676-B1A. Advantages of installation, operation and maintenance costs are outlined for types YC and DYC compressors. Information and illustrations are offered on component parts of the units, including frame. Worthington Corp.

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DATA FILE

(Begins on page 226)

326 Industrial Air Compressors—Advantages of company's line of industrial air compressors are detailed in 16-pp Catalog 5510. Tables indicating weights, code words and dimensions are included, as well as cutaway views showing design and operation details. Compressor specifications are given, and dimensional diagrams and other material included. Schramm. Inc.

MAINTENANCE

328 Basic-Roofing Information—"What You Should Know About Your Roof" is a 40-pp clearly illustrated booklet which tells what makes a roof fail, how to recognize signs of roof deterioration, what to do to keep a roof in good condition. Discusses recommended roofing practices, essentials of good re-roofing job. Johns-Manville.

329 Repairing Concrete Floors—A seven-step procedure for repairing concrete floors with non-shrink mortar is described in this folder, EPMM-4. Each step is illustrated with an actual photo. The Master Builders Co.

330 Handbook on Coatings—This 1958 Coating Manual is a 32-pp treatise highlighting the stopping and preventing of rust on nearly all types of rustable metal. Book contains information and recommendations to enable determination of specific coatings needed. Basic principle of Rust-Oleum's fish oil penetration into pores of metal is illustrated. Application photos give new ideas for protecting girders, tanks, boilers, roofs. Contains 100 color chips. Rust-Oleum Corp.

331 Light Scaffolds—This series of illustrated bulletins describes company's line of aluminum alloy Up-Right scaffolds and accessories. Pictures one-piece sections and multi-section models with various ranges of adjustability. Points out safety features. Up-Right Scaffolds Div., Up-Right, Inc.

TOOLS, MACHINE SHOP

332 Portable Electric Tools—This standard catalog, Form 10, 24-pp, features portable electric tools, including electric drills, bench-drill stands, hole saws, buffing and polishing kits, sanders, polishers, grinders, hammers, etc. The Black & Decker Mfg. Co.

333 On Electrode Selection—How to select proper electrode for any welding job is covered in 12-pp Weldirectory Bulletin 7000.1. Describes basic characteristics of each family of electrodes, including deposition, arc action, amount of slag, bead appearance. Differentiates between individual electrodes. The Lincoln Electric Co.

334 Pipe Tools—Ordering and application information on Ridgid pipe tools is provided in 16-pp illustrated Catalog 7596R6. Wrenches, cutters, threaders, reamers, vises, and others are pictured and described, also power drives, pipe and bolt threading machines, oilers. The Ridge Tool Co.

335 Air Tools—Features and applications of company's line of air tools with torsion bar torque control are outlined in 48-pp Form 5200-B. Cutaway views illustrating design and construction features are included, as well as specification tables and photos of typical applications. Accessories for use with the tools are also covered. Ingersoll-Rand.

336 Industrial Wrenches, Hand Tools—Tools for production lines, maintenance work and product servicing are featured in a 156-pp Industrial Catalog 58-1. Loaded with pictures and tool facts, book describes in detail the complete line of over 4,000 tools—including chests and roll-cabs, wrenches and sockets of all types, screwdrivers, pliers, pullers, electric impact wrenches, etc. Snap-on Tools Corp.

337 Data for the Shop—"Fluids and Facts for Metal Working" is a pocket-size booklet of about 44 pp. A section on metal working fluids covers their function and selection, preparation and use of soluble oils and paste compounds, and prevention of dermatitis. A section on metal working facts gives conversion tables, steel numbering systems, machinability ratings of metals. Standard Oil Co. (Ind.)

338 Vinyl Machinery Mount—Advantages of company's vinyl machinery mount are outlined in this illustrated brochure. Installations are shown. Clark, Cutler and McDermott Co.

CONSTRUCTION

340 Aluminum Building Products—This 36-pp catalog covers company's line of aluminum industrial building products. Cites advantages of aluminum, pictures some installations. Installation data, weights, dimensions and rough-in details are provided on corrugated roofing and siding, V-beam roofing and siding, ribbed siding sheet, perforated corrugated sheet, flat flashing sheet. Aluminum Co. of America.

341 Underpasses, Conduits—Manual TL-5956 is a 16-pp book explaining practical applications of underground passageways, their design and construction. Condensed data are given, as are drawings and photos. Armco Drainage & Metal Products, Inc.

342 Plastic Panels—Glass fiber reinforced plastic panels for skylighting and sidewall lighting are illustrated and described in this information bulletin. Advantages are detailed and panel specifications tabulated. Rippolite Plastic Products, Inc.

343 Replacement Glazing — Twelve-pp Booklet PL-251 gives detailed information on glazing industrial and other buildings with flat panels of the acrylic plastic, Plexiglas. Written for plant engineers concerned with frequent breakage of windows or other glazing problems, this practical booklet gives properties of this sheet. Plastic Dept., Rohm & Haas Co.

344 Building Panels, Panes — Form SL-3, 8 pp, presents Structoglas A reinforced plastic corrugated building panels and flat panes, giving information on product's mechanical and physical properties, chemical resistance, colors and finishes. Installation instructions cover sidewall mounting, roof construction. Structoglas Div., International Molded Plastics, Inc.

345 Face Brick — Brochure B-158 contains a set of 24 color reproductions which illustrate the wide range of glazed and unglazed facing brick for all types of interior and exterior walls. Also included is detailed information regarding size, color and availability of various types. Natco Corp.

346 Foundation Pipe Piles—Comprehensive information on Taylor Forge spiral-weld foundation pipe piles is presented in a 24-pp Form F-5677. In addition to detailed specifications, the illustrated booklet describes a number of pipe-pile installations and includes driving logs. L. B. Foster Co.

347 Fir Plywood—This 34-pp construction guide contains full-page structural drawings providing basic information on types, grades, and applications of fir plywood. Booklet covers information on floor construction. Douglas Fir Plywood Association.

348 Pre-Fab Flooring — Advantages, construction details and typical installations of prefabricated floor sections (rafts) are presented in illustrated Bulletin 7. Shows how they provide a strong, reinforced, mobile flooring combining sub-floor and wearing surface. Also describes anchor steel plates for severe conditions and prefabricated flags. Stelcon Industrial Floors, Inc.

349 Grating and Treads — Bulletin 2527 is a 26-pp, illustrated bulletin on grating and treads for a variety of applications. Presents descriptions of electro-forged, rivited, rectangular, diagonal, U-Type and T interlocked grating and treads. Tables of safe loads and information on specifying are also included, as well as photos of typical applications. Blaw-Knox Co.

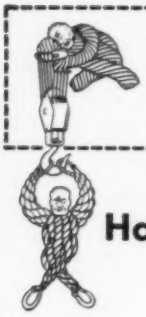
350 Non-Slip Flooring — Algrip, an abrasive rolled steel floor plate described as non-slip even on steel inclines, is the subject of Booklet AL-29, 8 pp. Discusses safety features, fabricating. Alan Wood Steel Co.

351 Overhead Doors, Operators — Features and advantages of company's line of Overdoors and electric operators for doors and gates are detailed in 8-pp Bulletin F-8436. Design and construction details are illustrated and described and specifications and installation layouts included. Barber-Colman Co.

BENCHES, STANDS, SHELVES

352 Shop Equipment—Work benches, tool stands, shelving and other pressed steel equipment for the shop, laboratory and assembly line are shown in 8-pp Form 2299. Construction features and specifications of size, top material, equipment variations given. Standard Pressed Steel Co.

353 Guide to Shelving — To assist plant engineers in selecting proper shelving for all storage requirements,



Tuffy. Tips On

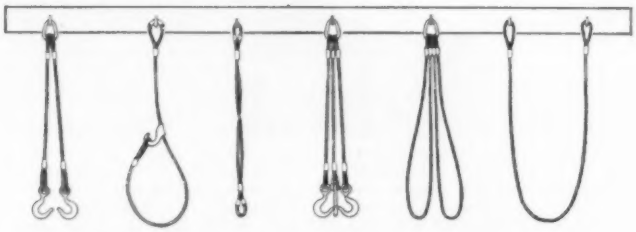
SAFE USE OF SLINGS AND HOIST LINES

Half of All Workmen's Compensation Cases in Ontario Caused by Materials Handling Accidents

Officials of the Workmen's Compensation Board at Toronto recently reported that 50% of compensation cases in 1956 (excluding accidents in which workmen were struck by something) were caused in materials handling work. Back injuries totaled 16.7% of compensated cases. Medical aid and compensation for back injuries added up to $4,520,000.

That's a high price to pay, in human disability and suffering as well as in dollars, for avoidable accidents. It can be greatly reduced if safe methods of materials handling are more widely adopted and more diligently applied.

Here are some of the things you can do to reduce hazards of faulty equipment and operation:



Safety Begins with "Good Housekeeping"

Too often, slings are dumped in a corner of a storeroom after use. When they're needed again, it's difficult to untangle them and the wrong sling is chosen because it is easiest to get to. Shown here is a rack which makes orderly storage easy. Such tidiness makes for greater efficiency and safety all around.

1. **Keep slings,** ropes, chains, and cables in orderly storage when they're not being used. Such equipment can be damaged between lifts if it is left in haphazard piles.
2. **Don't allow** hitching equipment to remain loose on crane hooks, hoists and loads when not in use.
3. **Check hitching** equipment before using. Inspect it again before return to storage.
4. **Shake out** kinks and twists **to prevent kinked slings** before loading slings. Never use a kinked sling. Remember it is next to impossible to kink a Tuffy Sling in normal use; and when kinks do occur, they can be smoothed out with no serious damage.
5. **Make sure** crane and hoist controls are in best working condition. Test all equipment frequently.

FREE! Tuffy Sling Handbook

Gives complete data on Tuffy Slings — types, dimensions, weights and rate loads. Plus a complete rigger's manual and engineers notebook on wire rope constructions and specifications. Write for your copy now.

You're On the Safe Side With Tuffy. Slings

Maximum safety is one of the many benefits you get in Tuffy Slings. Here are some of the reasons why:

Pressed-On Streamlined Ferrules

Tuffy's pressed-on ferrule gives the tucked eye splice 100% of fabric strength. Applied under great pressure, the steel ferrule literally flows into spaces between wires and strands, developing friction force equal to full fabric strength. Streamlining eliminates snags and projections that might injure hands.

Tuffy's Exclusive Fabric

Only Tuffy gives you the exclusive, patented, machine-braided fabric that combines extra strength and flexibility never before built into any sling. It makes knotting and kinking next to impossible, and if kinks do occur they are easily smoothed out.

Your Tuffy Distributor Will Help You Save Money

He's stocked to give you fast delivery on Tuffy Slings, Hoist Line and other Union Wire Rope. The longer life and greater safety of Tuffy can reduce your operating costs. Get in touch with your Tuffy distributor now.

union Wire Rope corporation

SUBSIDIARY ARMCO STEEL CORPORATION

Specialists in high carbon wire, wire rope, braided wire fabric, stress relieved wire and strand

2272 Manchester Ave. **Kansas City 26, Missouri**

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the bigger your pumping problems . . . the better your reasons for giving them to

WHEELER-ECONOMY

You know how big problems can be, in selecting pumps for water works reservoir service. The Pumps you see here are specially designed and built to solve such problems. They're 36″ Axial Flow Wheeler-Economy Pumps, each of which delivers 28,000 gpm. And they've been in continuous service for many years with only routine maintenance and modest operating costs.

If you're puzzled over which pumps to use for water works, municipal or industrial power plant service, drainage, irrigation or flood control, see C. H. Wheeler. Your representative can help you even if you need capacities exceeding 220,000 gpm and heads of 75 feet. He'll give you expert advice on pump design and construction, and station arrangement suggestions you'll find helpful.

Economy Pump Division

C. H. WHEELER MFG. CO.

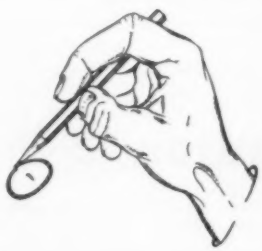
19th and Lehigh Avenue • Philadelphia 32, Pa.

Whenever you see the name C. H. Wheeler on a product, you know it's a quality product

Centrifugal, Axial and Mixed Flow Pumps • Steam Condensers • Steam Jet Vacuum Equipment • Marine Auxiliary Machinery • Nuclear Products

For more facts circle 645 on Reply Card

You'll find two postage-free Reader Service Cards on pages 221-222. Use them for ordering these catalogs—just circle item number of those you want. You may also use the cards for requesting advertising catalogs.



DATA FILE

(Begins on page 226)

64-pp Catalog 30 offers detailed suggestions for correct shelving and storing materials, loose and packed parts, record files. Shop equipment and storage cabinets are also described, and instructions included for planning and construction of stockrooms. Deluxe Metal Furniture Co.

SLINGS, CHAINS, WIRE ROPE

354 Wire Rope Manual—"Inspection of Wire Rope," "Methods of Lubricating Wire Rope," "Use and Abuse of Wire Rope," and "Sheave Maintenance" are among subjects covered in this 188-pp Wire Rope Manual, Catalog G-16. In addition, there are sections devoted to strengths and weights of wire rope, cable assemblies, and rated capacity of slings. Manual is available to qualified plant engineers. Macwhyte Co.

355 Wire Rope Selection Tips—This 16-pp illustrated booklet, "How To Be A Wire Rope Expert," describes basic principles governing selection of proper rope construction. Describes five factors to be considered and shows how these can be balanced for best possible efficiency regardless of application. Also illustrated is a device called the D/d ratio for determining best relationship of rope size to sheave or drum size. Popular wire rope constructions are described, applications listed. Leschen Wire Rope Div., H. K. Porter Co., Inc.

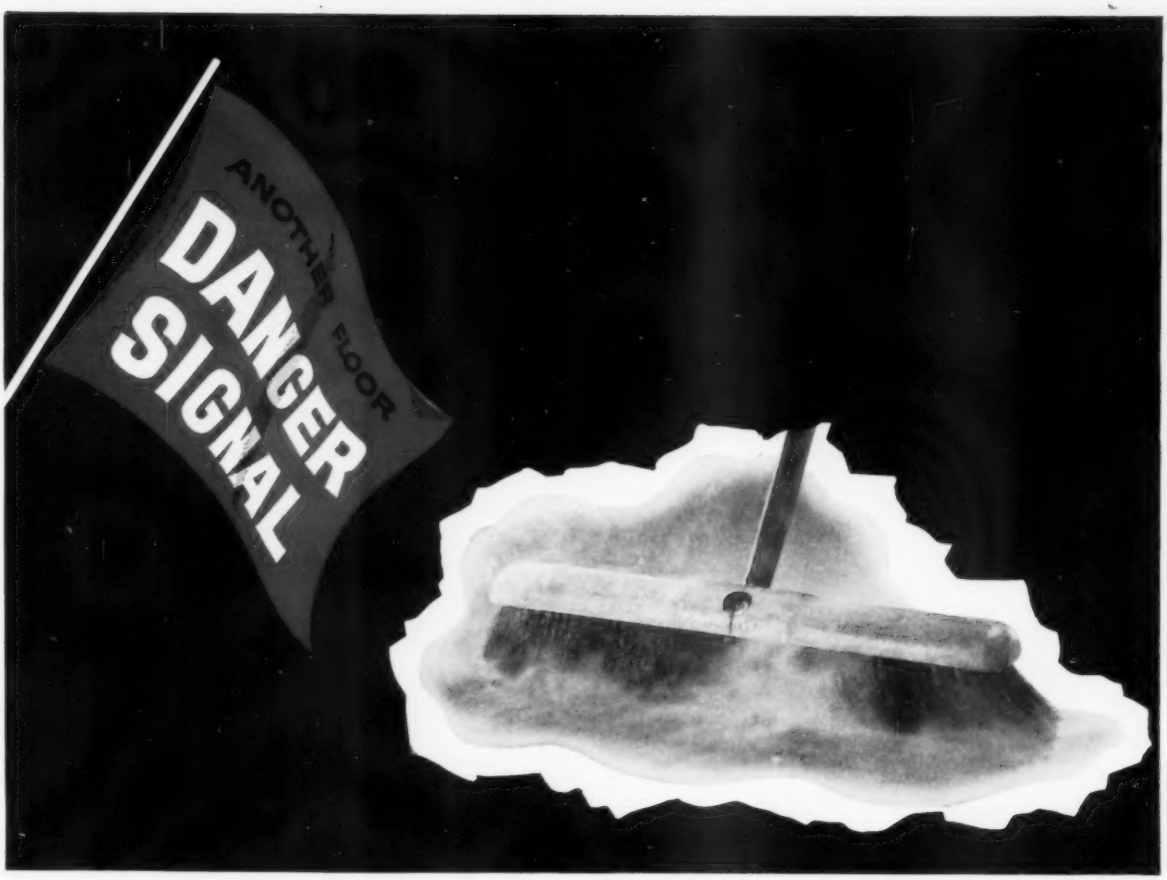
356 Sling Chain Handbook — Illustrated Data Book 100, 32 pp, presents "how to do it" information on sling chains—from ordering to care, use and inspection. Contains diagrams, charts and tables on standard and special styles of sling chains and attachments. Columbus McKinnon Chain Corp.

357 Sling Handbook—Form SL-3 is an illustrated 40-pp reference book covering more than 80 subjects on slings and fititngs. Included in this revised edition is reference information condensed into handy chart form on sling types, dimensions and rated loads. In addition, section on sling fittings has been expanded to cover fittings not previously shown. Union Wire Rope Corp.

358 Drop Forged Fittings—Comprehensive data on company's line of drop forged fittings for wire rope and chain are presented in 40-pp Catalog 950-2. Includes specifications, dimensions, rated capacities and weights. Also announces range of sizes and capacities in many of items listed, as well as new products, including clips. Crosby-Laughlin Div., American Hoist and Derrick Co.

MATERIALS HANDLING

359 For Overhead Handling—Booklet 2008-M, 12 pp, is replete with illustrative material on principal components of overhead handling systems. Track design and advantages of supporting it flexibly are described, and formulas and figures for comparing various track systems are included. Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.



DUST due to incomplete floor care

Uncontrolled dust is hazardous, expensive. Endangers precision instruments. Redeposits itself in bins, shelves and on warehouse inventories where it must be removed again. Spreads air-borne bacteria that cause infection and absenteeism.

All these hazards are simple to prevent. How? With a complete program that prevents and controls dust while protecting floors from the surface down — the West Program of Floor Preservation and Care.

What is it?

Three basic steps. Cleaning. Sealing. Maintaining. Adapted to the individual needs of floors by West Representatives who specialize in methods as well as materials.

The West Program reduces daily maintenance and solves any floor problem from uncontrolled dust to staining, slipping and other hazards. A test area demonstration will show you how. No obligation of course. Just send the coupon or contact your local West Office.

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☐ Please send your 32 page booklet, "The Proper Care of Floors."

☐ Please have a West Representative telephone for an appointment.

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Position_____

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Years of experience are packed into this new 6-article series — each an invaluable guide for keeping commutators and slip rings at peak performance.

Each article discusses a major part of the overall problem — gives practical tips on maintenance — tells how to solve common problems — what to do and how to do it — in easily read shop language. Supplied in attractive folder, forming complete maintenance data file.

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DATA FILE

(Begins on page 226)

360 Overhead Handling Systems — This 8-pp catalog pictures and describes a line of overhead handling equipment and details advantages of overhead handling systems for various industrial operations. Typical applications are pictured. The American MonoRail Co.

361 Automatic Bulk Handling—Bulletin 530, 32 pp, on Airstream conveyors, presents information showing how pneumatic conveying has solved many bulk handling problems. System diagrams of typical installations point out applications and flexibility of conveyors. Over 70 illustrations show how air transports granular or powdered material. Dracco Div., Fuller Co.

362 On Chain Block Safety—This wall chart illustrates safe handling of chain blocks. Sketches cover nine principles of handling, showing what should always be done and what should never be done. Reverse side of the chart gives data on blocks and trolleys. Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc.

363 Trolley Conveyor—Described in 8-pp Bulletin T-58 are features and advantages of company's trolley conveyor for light-duty applications. Specifications and dimensional diagrams are included, as well as installation instructions. Mathews Conveyer Co.

364 Electric Hoists—Twelve-pp Bulletin DH 133B describes Speedway electric hoists of 500- to 4000-lb capacities. Fully illustrates and explains design features and gives details on suspensions and conducting systems. Clearance data included. Wright Hoist Div., American Chain & Cable Co., Inc.

365 Heavy Duty Hoists — Bulletin 142-G, 24 pp, contains illustrated data on company's line of heavy duty electric hoists, including lug suspension, hook suspension, with plain trolley, with geared trolley, with motor driven trolley, and the 5-ton capacity models. Advantages are detailed and component parts illustrated with photos, drawings and diagrams. Specifications included. Chisholm-Moore Hoist Div., Columbus McKinnon Chain Corp.

366 Electric Hoists — Six-pp illustrated Bulletin 905 describes R&M Type J electric wire rope hoists in capacities of ¼, ½, 1 and 2 tons. Shows complete specifications including mounting options and sectional drawing. Hoist & Crane Div., Robbins & Myers, Inc.

367 Production Handling — Bulletin FM describes the Flow-Matic system—a movable, work level stand with hopper arrangement—for bulk handling of small parts. A complete line of boxes to work in conjunction with system described. The Powell Pressed Steel Co.

368 Steel Conveyor Belts—"A profitable approach to the selection of steel processing conveyor belts" is the subject of this 16-pp bulletin. Simplified selection, standard specifications, and installation information are included. The Colorado Fuel and Iron Corp.

Note imbedded Nylon plug locks screw automatically
SEXAUER
EASY-TITE
Note Fiberglas backing — resists closing squeeze

NEW WAY TO

Prevent Faucet Leaks!

★ **9 out of 10 washers are fastened with screws that are TOO LONG or SHORT. The screws quickly loosen; the loosened washers are destroyed thru grind and squeeze of opening and closing faucets.**

34 years of research uncovers new solution

★ **Now, NEW (Patented) 'Sexauer' SELF-LOCK Monel screws, with an imbedded expanding NYLON PLUG, lock at the required depth AUTOMATICALLY, hold washers FIRMLY! Made of rustproof, noncorroding Monel, heads don't twist off, screw slots don't distort. They are easily removed when necessary, can be re-used repeatedly.**

★ **Used with NEW 'Sexauer' EASY-TITE faucet washers, they make a combination that outlasts past faucet repairs "6-to-1"! EASY-TITES are made of super-tough, pliable du Pont compound (neither rubber nor fibre) and reinforced, like a tire, with a vulcanized layer of Fiberglas. They resist distortion and splitting from shut-off grind and squeeze.**

Hidden costs of faucet leaks!

Faucet leaks are costly! As authenticated by Hackensack, N. J. Water Co. and American Gas Association, stopping just ONE PIN-HOLE SIZE (1/32") LEAK can reduce water waste 8,000 gal. quarterly. If a HOT WATER FAUCET LEAK, water and fuel savings JUMP to over $7.58 QUARTERLY—plus additional savings on MATERIALS, LABOR and costly FIXTURE REPLACEMENTS!

NEW SELF-LOCK screws and EASY-TITE faucet washers are just TWO of the "SEXAUER" line of over 3000 TRIPLE-WEAR plumbing repair parts and Pat'd. precision tools.

A "SEXAUER" Technician in your vicinity will make our NEW 126 page Catalog "H" available. He will gladly consult with you regarding a SURVEY of your plumbing fixtures to determine correct repair parts required and establish reasonable stock levels that avoid both overstocking and shortages—thus providing for efficient stock arrangement and control—all without obligation. WRITE TODAY!

J. A. Sexauer Mfg. Co., Inc., Dept. S-98
2503-05 Third Ave., New York 51, N. Y.
Gentlemen: *Please send me a copy of your NEW, 126 page catalog "H."*

My Name_____ Title_____

Company or Institution_____

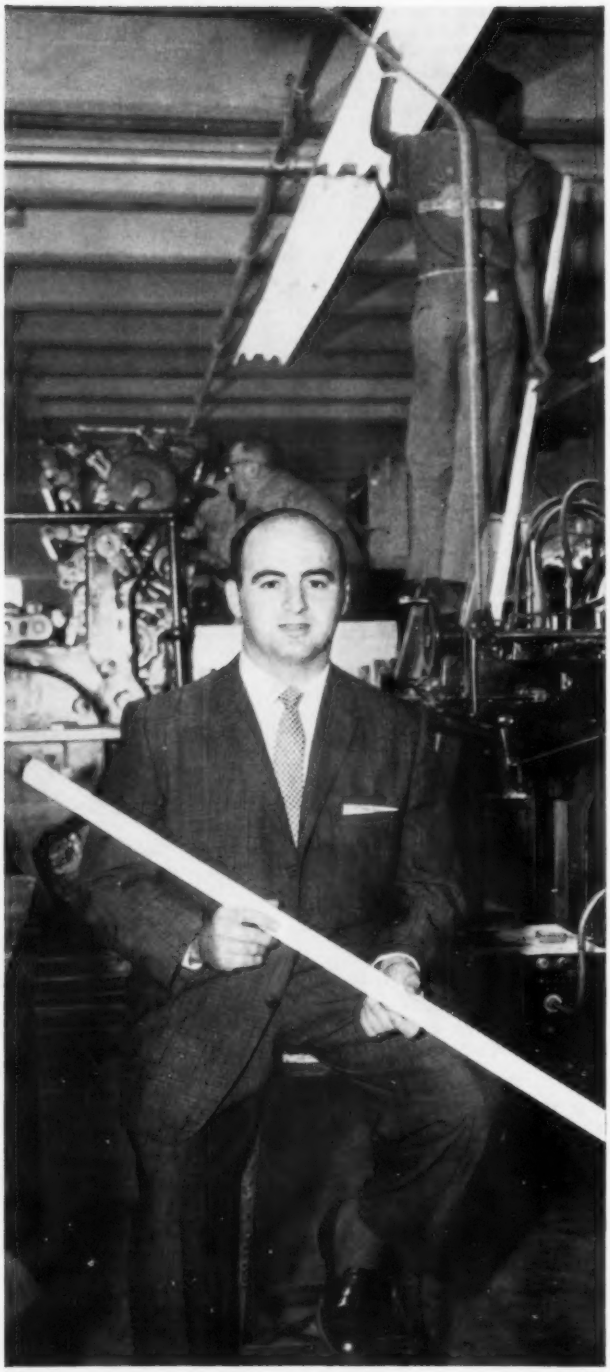
City_____

Zone____ State_____

SEXAUER
WORLD'S LEADING SPECIALISTS IN PLUMBING AND HEATING REPAIR PARTS

For more facts circle 648 on Reply Card

"We keep lighting maintenance costs down by using quality products...



that's why we use General Electric lamps"

"We're lighting maintenance contractors whose services include replacing burned out tubes, ballasts, starters — and the periodical cleaning of fixtures," says Herbert Mendelsohn of Sun Ray Lighting Company, Kansas City, Mo., "and we must keep our customers' lighting at peak operating efficiency quickly and economically.

"So, in effect, *we sell footcandles at the lowest possible price.* Naturally, we use the lamps that give more light for the current used, and are the most reliable. A defective tube causes an extra service call—as does an early burnout. So we use General Electric Lamps that last longer and have virtually no defects. This way our customers get better lighting—and we hold our costs down while improving our profit picture."

Whether you now buy your own lamps—or use a contract service such as Mr. Mendelsohn's, you can get more value for every dollar you spend on lighting by specifying General Electric Lamps. Call your nearby G-E Lamp Specialist and see for yourself. Or write: General Electric Co., Large Lamp Dept. C-840, Nela Park, Cleveland 12, Ohio.

OPERATION up turn

Progress Is Our Most Important Product

GENERAL ELECTRIC

G-E LAMPS GIVE YOU MORE VALUE FOR ALL YOUR LIGHTING COSTS

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When you build, remodel, add on... be sure to get

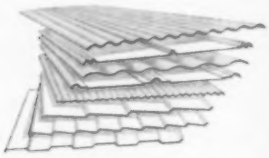
FREE LIGHT!

with RIPPOLITE translucent plastic panels!

Rippolite cuts glazing costs up to 60%... cuts glare to pleasant diffused light.

Fast and easy to install—even on cloudy days transmits good working light... cuts light bills.

Strong... tough... won't shatter. Defies vandalism.



Widest variety of designs and colors... quality engineered since 1944. Guaranteed to comply with U.S. Dept. of Comm. Specs. Coml. Standard CS 214-57.

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BURBANK, CALIFORNIA

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ADDRESS_____

CITY_____

ZONE_____ STATE_____

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DATA FILE

(Begins on page 226)

369 Casters and Wheels—Twenty-pp Condensed Catalog 157-G covers many styles of casters, wheels and glides. Listings cover products for industrial, institutional, office and other applications. Installation guides, selection tables, descriptions and specifications for a full range of casters and wheels are included. The Faultless Caster Corp.

370 Casters, Wheels — This 192-pp manual, Number 60, contains detailed information on a line of casters and wheels designed for a variety of furniture and equipment applications. Dimensional data, specifications and price lists are provided for furniture and industrial casters and wheels, and photos, drawings and diagrams illustrating design and construction features are included. Darnell Corp.

SAFETY, SANITATION

371 Protective Clothing — Catalog 12000, 12 pp, describes and illustrates company's line of industrial clothing for protection against water, fire, acids and alkalis, slipping and scuffing. Various types of work gloves and suits and coats featured. The B. F. Goodrich Co.

372 Insect Control—Featuring manufacturer's insecticides and insect control equipment, this practical 36-pp booklet provides excellent tips on the control of industrial insects. More than 60 pests are pictured along with specific information on where they are found, identifying features, extent of damage, life stages and cycles, characteristics of existence, and recommended control measures. Ten insecticides detailed. West Disinfecting Co.

VALVES, TRAPS, FITTINGS

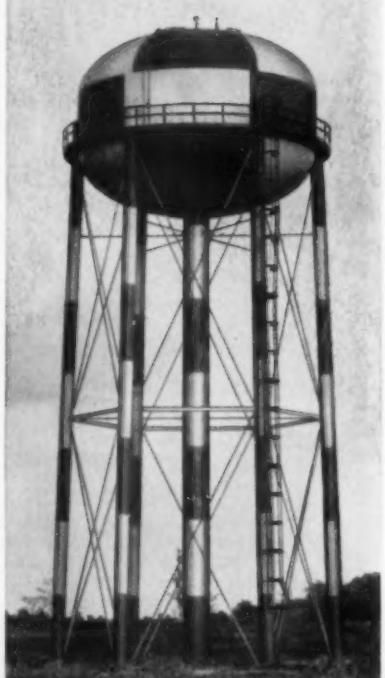
374 Valve Performance Facts — Included in this 36-pp booklet are 32 case histories of cost-saving valve installations. Service applications covered include steam, oil, water, coating fluid, chlorine, phenol, pulp stock, vacuum, others. Crane Co.

375 Industrial Valves—Bulletin 507V illustrates and describes company's line of industrial valves for control of air, gas, liquids and solids. Features photos and descriptive detail on a variety of valves, including butterfly valves, wafer butterfly valves, slide valves, others. W. S. Rockwell Co.

376 Silent Check Valves — Bulletins WH-654, WH-754 and 856 feature detailed descriptive and engineering data on company's line of silent check valves for a variety of applications. The bulletins cover center guided, globe type, and a silent gas-air check valve. The Williams Gauge Co., Inc.

377 Gate Valves—Catalog Section A features a line of leakproof gate valves incorporating a double sealing action. A cutaway view showing engineering features is included, as well as tabulated dimensional data, diagrams, and installation and operation instructions. Hamer Valves, Inc.

Which Size Is Best for Your Water Supply Requirements?



GRAVER®

FABRICATES AND ERECTS ALL SIZES... FROM 25,000 TO 3,000,000 GALLONS

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for Elevated Water Tanks

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You find Gates Hose where anything flows

Mackinac Bridge, world's longest suspension bridge, connects upper and lower peninsulas of Michigan. Because reliability of equipment is an important factor in the grouting operations, Gates Water and Air Hoses were used.

PHOTOS COURTESY MACKINAC BRIDGE AUTHORITY

Gates Air Hose helps build bridge "that couldn't be built"

TPA 304

Industry everywhere depends upon Gates Industrial Hose to provide air, water, steam, oil and suction for every type of application, including some of the toughest jobs in the world.

Actually there are *tens of thousands of miles* of Gates Hose in daily use — every type and size from air hose the diameter of a pencil to petroleum hose as big as the mains in city streets.

Back of the world-wide acceptance of Gates Hose is a continuing program of *specialized* hose research at the multi-million dollar Gates Research Center staffed by more than 200 chemists, physicists, engineers and technicians.

It is the aim of this *specialized* research to increase hose utility and life, and to lower industry's annual hose costs.

Because Gates Hose is so widely preferred, it is quickly available from leading distributors in all industrial centers in the United States and in 90 countries throughout the world . . . and its outstanding performance is guaranteed by the *World's Largest Maker of V-Belts.*

Gates 18HB Air Hose, with oil resistant tube and abrasion resistant cover, gives exceptional performance on all heavy duty air usage. This popular hose — one of many in Gates full line — is always available from your nearby Gates Distributor.

Mark of Specialized Research

Gates

The Gates Rubber Company • Denver, Colorado

Gates Industrial Hose

Made in a Full Range of Types and Sizes

ILLCO-WAY
ionXchange

soften
de-alkalize
clarify
WATER

REMOVE
organic matter
turbidity
color
iron

U. S. AIR FORCE PHOTO

HIGH-FLOW, UP-FLOW
CLARIFIER

The Clarifier shown above is part of an ILLCO-WAY ionXchange installation, at a metal-finishing plant, which is used for waste disposal and water recovery. Similar Clarifiers are widely employed to clear up surface waters used by various industries — removing organic matter, hardness, alkalinity, turbidity, color, and iron, as required by specific conditions.

USED AS PRE-TREATMENT

In many instances it is more economical to use a Clarifier in the initial part of a system. Certain water supplies contain organic matter or turbidity which can be removed most efficiently by flocculation, or contain carbonate hardness or alkalinity which can be largely reduced by precipitation — in which situations, a Clarifier is indicated as best. *Let us analyze the water you propose to use, and advise you.*

ILLCO-WAY
ILLINOIS WATER TREATMENT CO.
840 Cedar St.
Rockford, Ill.

NEW YORK OFFICE: 141 E. 44th St., New York 17, N.Y.
CANADIAN DIST.: Pumps & Softeners, Ltd., London, Can.

For more facts circle 653 on Reply Card

DATA FILE

(Begins on page 226)

378 Lined Clay Pipe—Described in this illustrated brochure is a glass lined sewer pipe with built-in advantages. Performance and installation details are illustrated and described. American Vitrified Products Co.

379 Hydraulic Control Valves—Catalog 200-7, 16 pp, describes construction features and advantages of company's line of hydraulic control valves. Photos, dimensional diagrams, circuit wiring diagrams and data included. Logansport Machine Co., Inc.

380 Plug-Type Valves — Long-life features of company's stainless steel plug-type valves are stressed in 6-pp Form 202-A. Cutaway view illustrates important design and operation features. Jenkins Bros.

381 Blow-Off Valves—Bulletin B427, 20 pp, describes features and advantages of company's blow-off valves for boiler pressures up to 415 lb. Covers construction details, materials used in the valves, and includes specifications, weights and dimensions, tables of average physical and chemical properties of materials, photos of typical installations, etc. Yarnall-Waring Co.

382 Valve Lubrication—This 19-by-24-in. chart contains maintenance and lubrication information for company's lubricated plug valves. Of heavy paper with metal edges, the chart features detailed exploded views of four types of valves and includes a table of recommended lubricants for oil, water, gas and chemical service. Meter and Valve Div., Rockwell Mfg. Co.

383 Corrosion Resistant Valves — Eight-pp Bulletin 8 provides engineering specifications and a discussion of the advantages of Aloyco 20 valves. Basic types and adaptable features of these corrosion resistant valves are presented. Includes data on corrosion tests on this metal with concentrations of sulfuric acid. Alloy Steel Products Co.

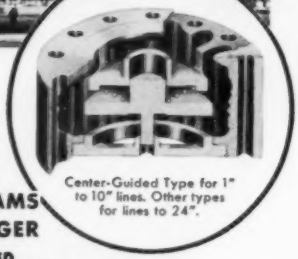
384 Gages, Needle Valves — Catalog 76-G consists of a loose-leaf bound collection of literature on gages and needle valves. Various types of gages are illustrated and described, with applications and specifications fully detailed. A section on accessories is included. Jas. P. Marsh Corp.

385 Swivel Joints — Catalog G-4R, 32 pp, covers this manufacturer's line of ball-bearing swivel joints as well as other products, including loading racks, manifolding lines, all-metal hose. In addition to providing dimensional and operating data on products, booklet is well illustrated. Chiksan Co.

386 Steam Trap Book — Catalog J. 44 pp, serves as a manual on trapping practices. Includes a catalog section giving physical data and prices on cast semi-steel and forged steel inverted bucket steam traps, compound steam traps, and ball float air and air relief traps. Handbook section tells how to calculate condensate loads, and select

Water Hammer
PROTECTION
FOR
SOCONY MOBIL
BUILDING • NEW YORK

Architect:
Harrison & Abramovitz
Engineer for Plumbing, Heating and Air Conditioning:
Jaros, Baum and Bolles
Plumbing Contractor:
Eugene Duklauer Inc.
Heating and Air Conditioning Contractor:
Kerby Saunders



Center-Guided Type for 1" to 10" lines. Other types for lines to 24".

WILLIAMS
-HAGER
FLANGED
Silent
CHECK VALVES

Here again on a major American building protection against water hammer is assured by Williams-Hager Silent Check Valves. The valves operate instantly when flow reversal starts or when flow is zero.

Write for Bulletins:
No. 654 on the Valves
No. 851 on Cause, Effect and Control of Water Hammer

CHECK VALVES
THE WILLIAMS GAUGE CO., INC.
144 Stanwix Street
2 Gateway Center Pittsburgh 22, Pa.
Our 72nd Year • 1886-1958

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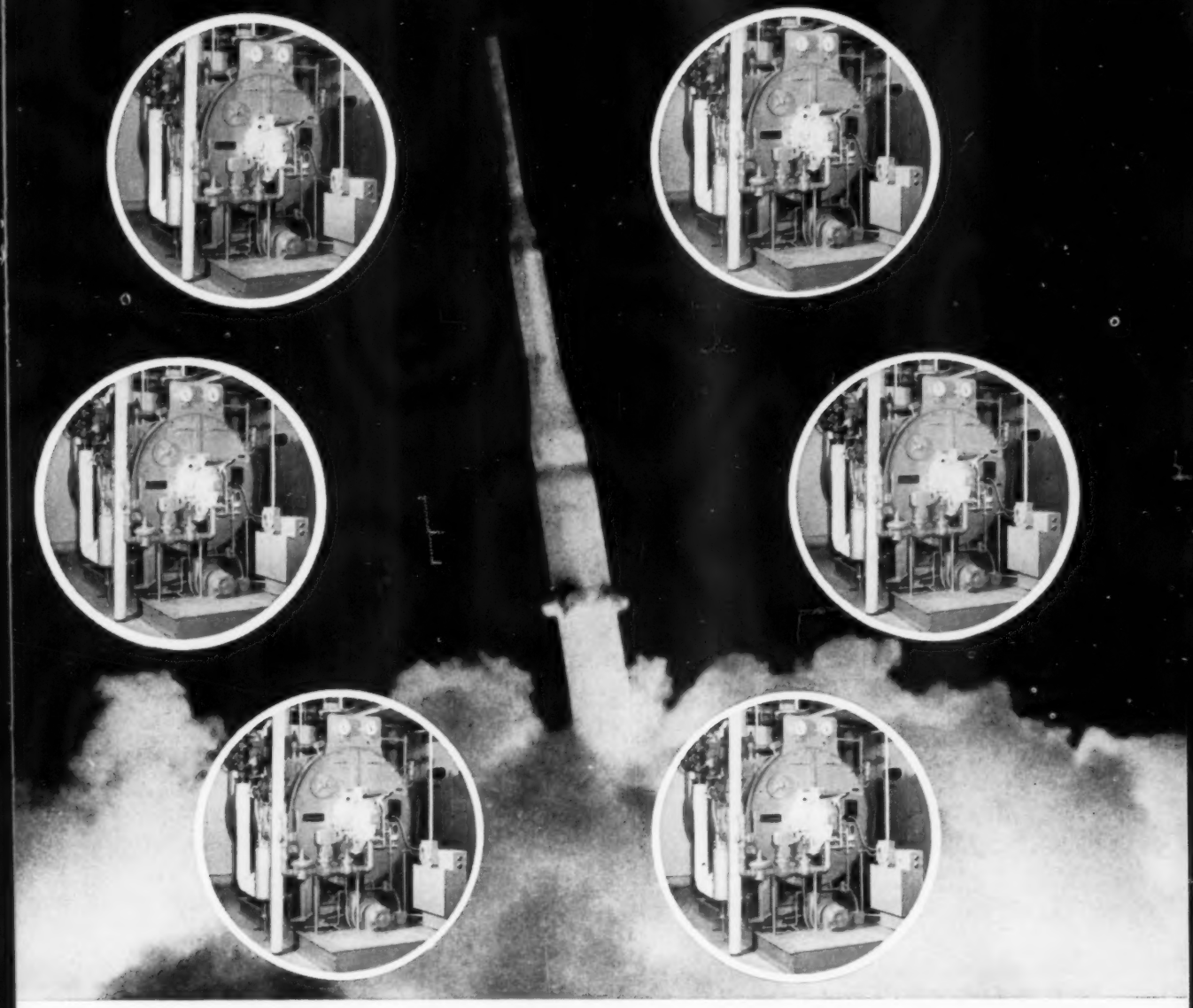
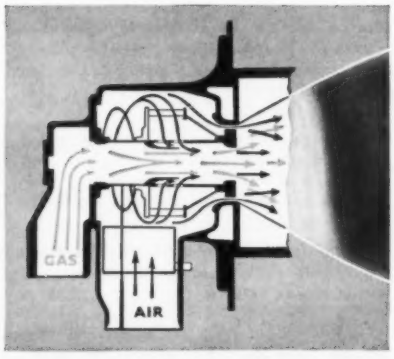


Missile plant builds efficient, automatic hot-water heating system around 6 *Powermasters*®



Designed and built by O&S expressly for Powermaster, *this pre-mix gas burner assures complete, clean combustion over full firing range with any gas of heat value of 500 Btu or more per cubic foot. Simple, sturdy construction minimizes maintenance.*

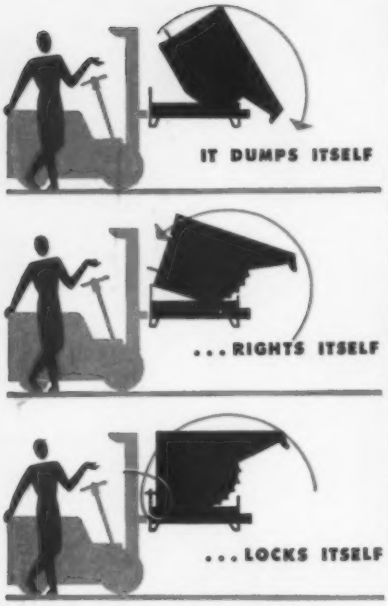
• Installed on top of washrooms . . . saving valuable production space . . . six *Powermaster* Packaged Automatic Boilers provide low-cost *hot-water* heating comfort in four separate buildings of a well-known missiles plant. These gas-fired units operate 7 days a week as needed to maintain 70°F temperature in office and work areas. *Powermasters* have an impressive record for dependable, money-saving performance in a long list of hot-water heating applications. Being compact, completely factory-assembled, easily-installed "packages", they save valuable floor space, as at this missiles plant. Fully automatic controls and efficient burner design assure fuel-saving operation with least attention. Find out how O&S experience and *Powermaster* advantages will pay off for you in providing hot-water heating for any kind of building. Call in your O&S representative. Send now for Bulletin 1241. Orr & Sembower, Inc., Reading, Pa.

O&S

ORR & SEMBOWER, INC.

POWERMASTER/Models 3, 4 and 5 . . . POWER-PAK and BURNERS

For more facts circle 655 on Reply Card



How to cut scrap handling costs 50%

Here's the fastest, lowest cost method of scrap handling ever devised. Hundreds of industries are now using Roura Hoppers instead of barrels or tote boxes to collect scrap metal. They're placed alongside machines or in strategic locations. When full, lift truck operator picks up loaded hopper . . . transports it to scrap bin or freight car . . . flips the latch . . . and the hopper automatically dumps its load, rights itself, locks itself. Hopper is returned to its station and operator is free for other work.

Segregation of scrap is simple. Hoppers can be marked for copper, brass, stainless, etc. Brings higher prices.

Roura Hoppers are made in five sizes, ½ to 2 yard capacities. Sturdily built of 3/16" steel plate with continuous arc-welded seams. Also available in stainless steel or galvanized. Mounted on live skids or a choice of wheels. Standard models available for immediate shipment from stock.

Start cutting costs now . . . with Roura Hoppers. *Remember . . . if it's as good as a Roura it IS a Roura.*

ROURA
Self-Dumping
HOPPER

HERE'S HOW to get more details about Roura Self-Dumping Hoppers. Just attach this coupon to your letterhead . . . sign your name . . . and mail to . . .

ROURA IRON WORKS, INC.
1413 Woodland Ave., Detroit 11, Michigan

For more facts circle 656 on Reply Card

DATA FILE

(Begins on page 226)

traps for each class of equipment, and a maintenance section covers trap installation, trouble-shooting and repair. Armstrong Machine Works.

FILTERS

387 Filters, Strainers — Industrial Catalog 1058, 48 pp, provides application and engineering information on company's line of micro-filters and precision strainers. Fuel filters, full flow and by-pass lube filters, dry type air filters, air separators, and metal edge strainers for fuel lube and industrial use shown. Purolator Products, Inc.

388 Liquid Filters—Twelve-pp Bulletin 300 describes company's liquid filters for oils, water, chemicals and coolants. A cutaway view shows component features and tables list specifications and other data. Filtering media are also pictured and typical installations shown. Dollinger Corp.

HEATING, COOLING AND AIR CONDITIONING

389 Unit Heaters — Catalog 157, 32 pp, contains performance and application data on company's line of unit heaters, including design and construction details, dimension diagrams, and tabulated information on steam capacities, conversion factors, hot water capacities, performance factors, and heat transfer coefficients. Modine Mfg. Co.

390 On Unit Heaters — Latest improvements, specifications and performance data for Herman Nelson horizontal and vertical unit heaters are covered in 36-pp Bulletin 700A. Includes complete hot water and steam performance tables, dimensions, selections, applications. American Air Filter Co., Inc.

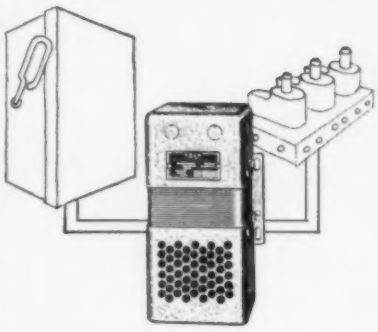
391 Electric Heat, 101 Ways—Principal industrial heating applications and methods are described in "101 Ways to Apply Electric Heat," a 32-pp booklet. Illustrated case histories show how metal-sheathed electric heating units are being used. Physical aspects of installation are detailed along with a discussion of the problem, solution and advantages. Edwin L. Wiegand Co.

392 Plumbing, Heating Supplies — Edition H is the current edition of this company's 126-pp general catalog on plumbing and heating repair parts, tools and accessories. Indexed and illustrated, the catalog gives detailed information on sizes, intended uses. J. A. Sexauer Mfg. Co., Inc.

393 Stainless Steel Heaters — Complete description and specifications on stainless steel direct-fired heaters are included in 6-pp Bulletin F-57A-RO. Cutaway views, drawings and diagrams illustrating design and construction features are included. Reznor Mfg. Co.

394 For Heating Systems — A great deal of helpful information on heating systems is presented in Engineering Data Manual 2695, 28 pp. Detailed illus-

End your line voltage variation troubles



Do line voltage variations cause production or control troubles in your plant? If so, Sola Constant Voltage Transformers can be your simplest, most dependable solution. They are quickly and easily installed, simply by connecting them between the line and the device that needs the voltage stabilization.

These compact, reliable units provide voltage output regulated within ±1% with line voltage fluctuations as great as ±15%. Regulation is automatic and continuous. They are self-protecting against short circuits on output or load circuit.

Your maintenance man can install a Sola Constant Voltage Transformer in little time. He has no adjustments to make. There are no tubes, no moving or renewable parts. Once installed, these stabilizers need no further attention — as they do their dependable voltage regulating job around the clock.

Guard against lighting failures

Mercury lamp outages due to line voltage fluctuations can be avoided by using Sola Constant Wattage Mercury Lamp Transformers. For fluorescent lamps, Sola Constant Wattage Fluorescent Ballasts provide positive lamp starting.

These fluorescent and mercury lamp ballasts operate lamps at full rated light output, regardless of line voltage fluctuations. They provide cool, dependable, ballast performance.

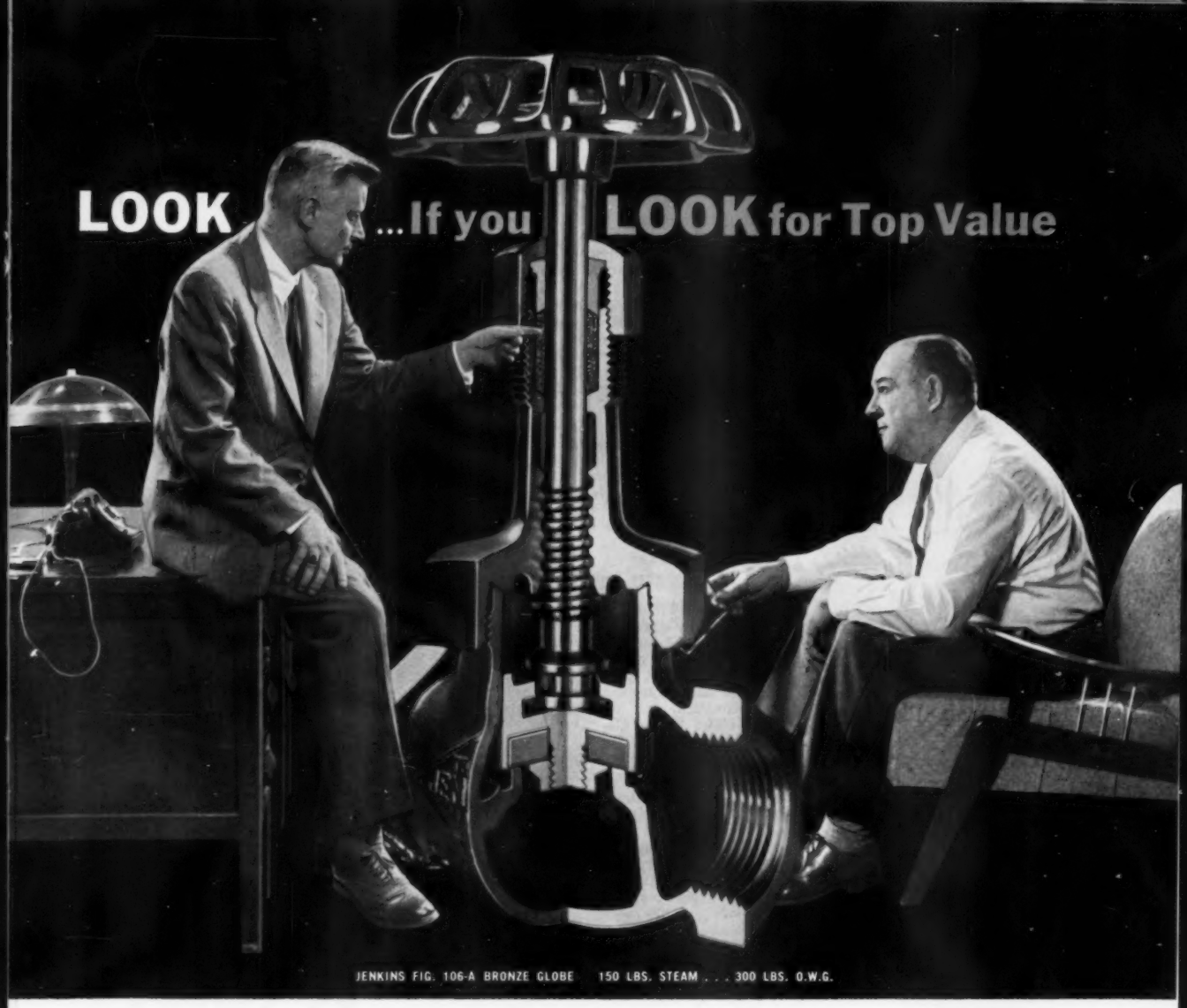
For full information write for literature

Sola Electric Co., 4633 W. 16th St., Chicago 50, Ill.

SOLA

Constant Voltage Transformers
Regulated DC Power Supplies
Mercury Lamp Transformers
Fluorescent Lamp Ballasts

For more facts circle 657 on Reply Card



in Disc Equipped Bronze Valves

LOOK at that Wheel — Tough malleable iron. Design unequalled for cool, sure grip.

LOOK at the Index Plate — Has Fig. No. etched in green background. Held by wheel nut which is secured by rolled-over spindle end.

LOOK at that Spindle — Made of high tensile bronze. See how much heavier it is . . . how many more deeply cut threads engage bonnet. And, the crowned head that reduces friction on disc holder. Sure, it costs more to make a spindle this way. But it reduces wear, preserves packing, means easier operation.

LOOK at the Packing Nut and Gland—Note the heavy and deep bronze hex. And, that bronze gland designed to compress packing toward spindle.

LOOK at that Packing Box — Its depth equals 1½ times spindle diameter. More packing space means less repacking. An asbestos, lubricated and graphited packing is used.

LOOK at that Bonnet — One-piece, screw-over design with big hex surfaces is easy to remove. Take an extra look at the bevel joint between bonnet and body, serving as an internal brace against the crushing effect of the bonnet assembly. Millions of Fig. 106-A in use for years prove this unique design licks distortion and springing.

LOOK at the Disc Holder — It's the Slip-on Stay-on type originated by Jenkins. Correct protective depth prevents flaking or cracking of disc.

LOOK at the Disc — Easily renewed without removing valve from line. Made of compositions to suit various services . . . and **made by Jenkins,** the only maker of both valves and discs.

LOOK at that Body — Just compare wall thickness of this high tensile bronze body with any other valve. The factor of safety is many times higher than rating requires. See the curved diaphragm to protect seat from distortion by pipe strain. Note that the raised seat is higher to permit more reseating operations . . . and wider, so it won't cut into disc. Pipe threads are full length and clean cut.

LOOK at this . . . for Throttling

—Just replace the standard disc nut with this Throttling Nut and a Fig. 106-A becomes well-suited to throttling service. This unique nut reduces the effects of wire drawing and its long legs restrict flow for accurate control. Many plants take advantage of this versatile valve to reduce valve and parts inventory.

THE FIRST renewable composition disc valve was a Jenkins Valve, originated nearly a century ago. Compare today's Fig. 106-A Bronze Globe with any other. See why so many valve users agree that a *Jenkins* is still the FIRST for top value. For descriptive folder No. 189-B on the full line of Jenkins Bronze Globe, Angle and Check Valves write to Jenkins Bros., 100 Park Avenue, New York 17.

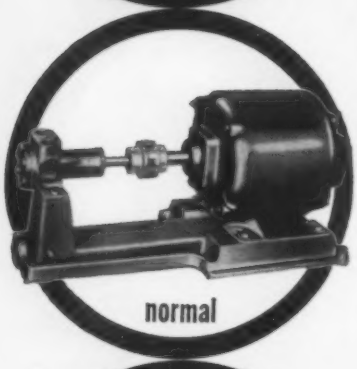
JENKINS VALVES

LOOK FOR THE JENKINS DIAMOND

JENKINS SINCE 1864

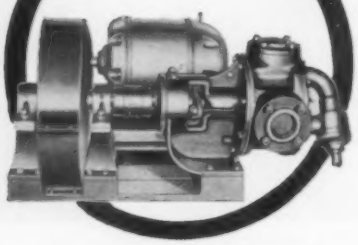
SOLD THROUGH LEADING DISTRIBUTORS EVERYWHERE

What job do you have for a VIKING PUMP?



normal

heavy duty



Sizes From 2/3 to 1050
G. P. M. Capacities

There is a Viking positive displacement pump for most industrial pumping requirements . . . probably yours. If you need fast, self-priming along with positive, smooth delivery, Viking Pumps are your answer — whether liquids are thin or thick.

In the Viking Pump line there are 750 cataloged models in 20 sizes, with additional thousands of specially built pumps available. This wide selection assures you of the right pump to fit your needs.

So, install Viking Pumps! Save space; Save dollars! Save installation and operating time! And let one of the simple Viking "gear-within-a-gear" pumps do your job the way you want it done.

Send today for Catalogs
Section BZ and CZ

VIKING
PUMP COMPANY

Cedar Falls, Iowa, U.S.A.
In Canada, it's "ROTO-KING" Pumps
See Our Catalog in Sweet's Plant Engineers File

For more facts circle 659 on Reply Card

DATA FILE

(Begins on page 226)

trated information pertaining to heating problems is given. Besides covering heating terminology, there are sections on steam data, water properties, piping data, weights and measures and pipe dimensions. Dunham-Bush, Inc.

395 No-Frost Refrigeration—Twelve-pp Bulletin 105 describes with diagrams and photos method used for food freezing, chilling and warehouse refrigeration without frost or ice formation. Advantages given. Niagara Blower Co.

396 Cooling Towers—Featured in 20-pp Catalog DFA-58 is company's double flow Aquatower, combining high efficiency with low silhouette. Specifications and engineering data are included, as well as dimensional drawings showing construction. The Marley Co.

INSULATION

397 Glass Fiber Insulation — Among the company's products described in this illustrated bulletin are three kinds of flame-blown glass fiber insulations used for thermal and acoustical applications. Charts are included illustrating the acoustical and thermal values. L. O. F. Glass Fibers Co.

398 Insulation Specifications—This set of six specifications covers applications of Foamglas insulation for industrial equipment and piping. Each booklet contains tables of suggested thicknesses of insulation to be applied, drawings of installation procedure, supports, and recommended finishes. Booklets are devoted to low-, medium-, high-, and dual-temperature equipment and piping, to underground piping, and spheres. Pittsburgh Corning Corp.

399 Piping Insulation — Seven-pp Bulletin SO 1054 features a snap-on, one-piece molded pipe insulation of fine glass fibers for hot or cold piping. Specifications are given for industrial, commercial, and institutional piping. Gustin-Bacon Mfg. Co.

400 Insulation Coating — This 32-pp illustrated handbook, Form L-17, presents the advantages of company's No-Drip insulation coating for preventing condensation drip from metal, concrete, brick, wood, plaster or composition surfaces. Lists applications and describes methods of use. J. W. Mortell Co.

FANS, VENTILATING

401 Ventilation Units—Bulletin FM-315, 25 pp, describes basic construction of company's package propeller fans for commercial and industrial applications. Illustrated case histories of typical installations included. Buffalo Forge Co.

402 Power Roof Ventilators—Bulletin 2301 is an 8-pp selection guide to company's low-silhouette line of power roof ventilators. Dimensions, capacity tables, and details on accessories and protective coatings are included. Ilg Electric Ventilating Co.

403 Air Engineering—Bulletin E-57 is a 24-pp air engineering data file covering engineering and test facilities for propeller fans, specifications, construction, maintenance, and installation. Tables for estimating air-handling requirements, entrance and elbow losses are provided. Aerovent Fan Co., Inc.

404 Air Handling Units—Complete engineering information on company's low pressure sprayed coil and high pressure dry and sprayed coil climate changers is incorporated in 56-pp Bulletin PB-290. Detailed descriptions and illustrations on the all-purpose air conditioners for commercial and industrial comfort and process applications are included. The Trane Co.

405 PVC Blowers and Fans—Advantages of unplasticized rigid polyvinyl chloride blowers and fans for exhausting corrosive air, fumes and gases are detailed in this illustrated bulletin. Physical properties of polyvinyl chloride are tabulated. Industrial Plastic Fabricators, Inc.

406 Propeller Fans—Bulletin A-109C, 32 pp, covers company's line of propeller fans, including standard propeller, utility, cool-blast, Lo-Noise, reversible and Bi-Pass duct fans, intake air units and unit heaters. Contains new fan sizes not shown in the previous edition as well as revised air deliveries, specifications. Hartzell Propeller Fan Co.

407 Air-Moving Equipment—Bulletin DB 45-58, 20 pp, contains detailed information on company's line of roof

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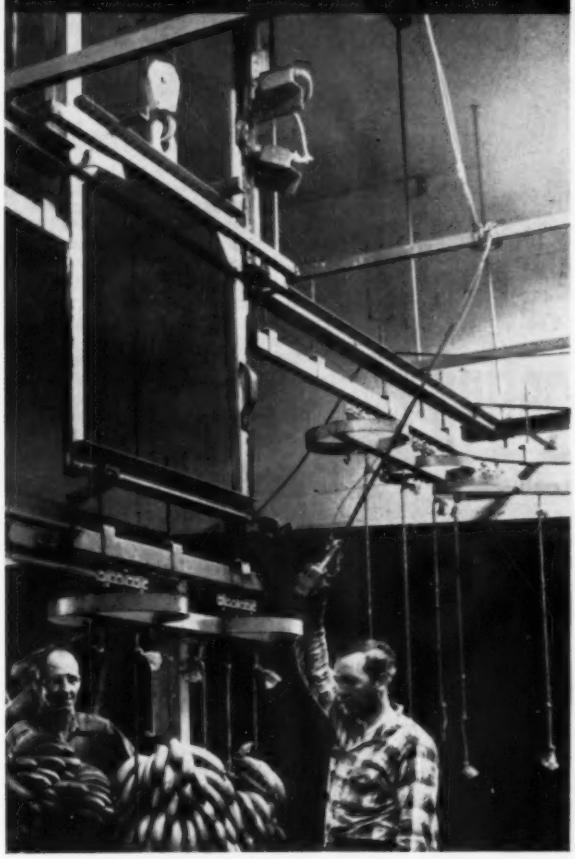

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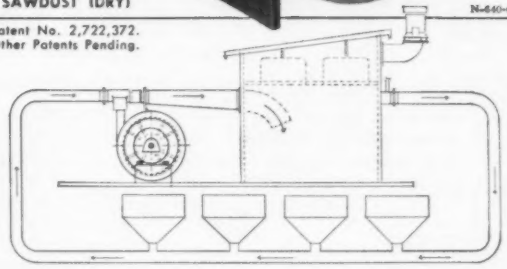

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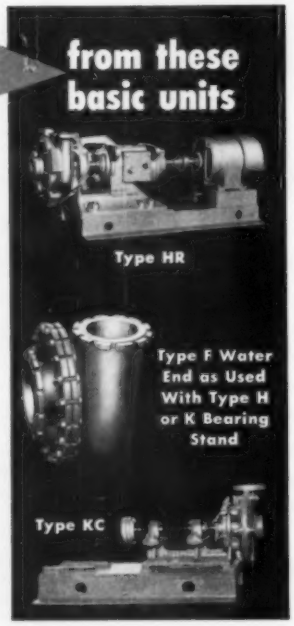

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DATA FILE

(Begins on page 226)

ventilators, bifurcators, axial flow vent sets, and air jets. Bonded performance ratings are listed on tables, and dimensional data and specifications included, as well as photos, cutaway views and diagrams. DeBothezat Fans Div., American Machine and Metals, Inc.

DUST CONTROL

409 For Dust Collection—A collection of product sheets providing application suggestions and specifications on Dustkop equipment designed to solve a wide range of dust handling problems is provided in the Series 700 bulletins. Various models are described and illustrated. Aget Mfg. Co.

410 Industrial Dust Control—A wide variety of collection methods for industrial dust control is described in 16-pp Bulletin 922. A typical case history is included as well as photos, cutaway views, drawings and capacity data on the various units. Pangborn Corp.

411 Dust Filter—Bulletin G-579, 8 pp, describes a dust filter featuring non-variable air volume counter flow for maintaining filter media porosity. Cutaway view showing component features is included, as well as capacity table, dimensions and specifications, and dimensional diagrams. The Day Co.

BOILERS AND GENERATORS

412 Packaged Automatic Boiler—Six-pp Bulletin 1241 describes company's packaged automatic boilers for both air atomizing and pressure atomizing, for oil burning and for gas. Covers operating features and includes chart listing ratings, dimensions, weights. Orr & Sembower, Inc.

413 Standard Generators—Bulletin B-55-4 describes company's SC economy series of standard steam generators designed to reduce steam costs for industrial plants. Pre-engineered, standardized steam generators offered in nine sizes with capacities of from 50-000 to 150,000 lb per hour are described. Foster Wheeler Corp.

414 Boiler Construction—Bulletin BE100 describes advantages of practical boiler construction with 2 pass design, featuring comparable results with equal heating surface, but with Continentals two-pass features—turbulent spinning gas technique - uniform heating - no refractory baffles and symmetry of furnace and tube layout. Boiler Engineering & Supply Co.

ELECTRICAL

415 Fan-Cooled Motor—Illustrations and description of company's totally enclosed fan-cooled electric motors are featured in Bulletin 827. Cutaway views show features. Brook Motor Corp.

416 Electrical Equipment Digest—Electrical equipment illustrated and described in 160-pp Catalog Digest 141, includes load centers, circuit breakers,

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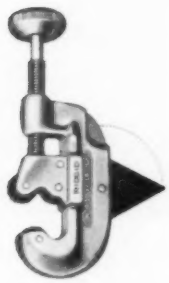
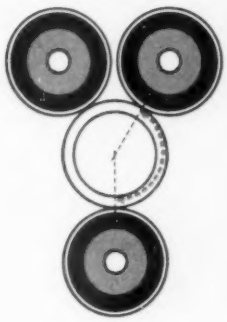
gives quick, clean cuts even in tightest places!





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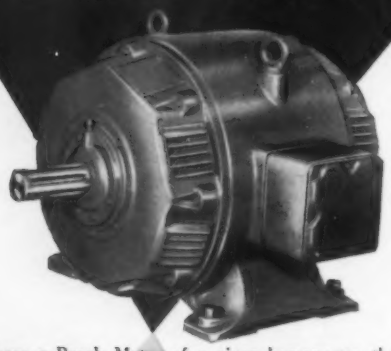

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DATA FILE

(Begins on page 226)

low voltage control, fusible service equipment and accessories, meter sockets and troughs, safety switches, panelboards, duct and fittings, starters, other equipment. Square D Co.

417 Conductor Systems—This 36-pp catalog describes the Insul-8-Bar systems of mobile safety electrification for cranes, monorails and moving machinery. Includes photos and descriptions of typical installations, engineering data, installation procedure, a photo-text list of items that comprise these systems. Insul-8 Corp.

419 Cathodic Protection Cable — Two kinds of cathodic protection cables are described in this informative bulletin. Special advantages of each are listed, and applications and specifications are given. General Cable Corp.

420 Varnished-Cambric Cables—Bulletin VC-56-10M, 22 pp, covers varnished-cambric cables in a voltage range of 600 to 5000 v for single and three-conductor cables braided or lead sheathed. Armored cable constructions in both galvanized steel armor and aluminum armor are shown. Rockbestos Products Corp.

421 Architectural Floodlighting—Eight-pp Bulletin GEA-6437 illustrates various methods of floodlighting industrial plants, public and commercial buildings and others. Provides information on general purpose heavy-duty floodlights. General Electric Co.

422 For High Voltage Cable—Test results and service records on an improved butyl rubber compound for high-voltage cables are announced in 12-pp Bulletin EB-27. Covers resistance to ozone, operating temperature, high-voltage, dielectric strength, aging, insulating resistance, moisture absorption. Anaconda Wire & Cable Co.

423 Wires and Cables—Interlocked armored cable, supports and fittings designed for low cost, heavy duty industrial, power or control wiring are described in this 24-pp bulletin. Photos and specific descriptions of various types of armored cables available for voltages through 15,000 v, single and multi-conductor are included. National Electric Products Corp.

424 Electrical Wires, Cable—Bulletin 1105, Section 1, 16 pp, features a cable selection chart and complete engineering information on company's line of electrical wire and cable. Advantages are detailed. The Okonite Co.

425 Flexible Electrical Conduit—Performance and application data on company's line of flexible electrical conduit are featured in this illustrated brochure. Specifications and ordering data are included. Electri-Flex Co.

426 Cable Troughs—This 12-pp catalog offers a simple solution to any design problem of change of direction or elevation with a complete set of standard fittings, horizontal elbows,

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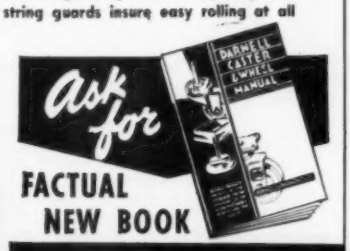

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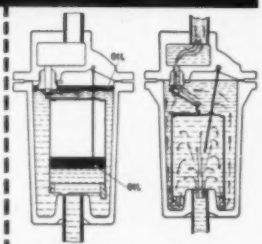

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How It Works

CLOSED: Oil collects on top of water in trap. Air in trap floats bucket. Valve held closed by pressure.

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DATA FILE

(Begins on page 226)

inside and outside vertical elbows, ties, crosses, covers and many special fastening devices. The Globe Co.

427 Cable Supports—This information folder contains data on company's cable supporting equipment, telling how to install cable supports, as well as giving advantages of cable trough. T. J. Cope Div., Rome Cable Corp.

428 Fuses for All Uses—This revised edition of manufacturer's complete line, Folder 3, includes illustrations and descriptions of fuses for every purpose. Features dual-element cartridge fuses for time-lag in protection against overloads, and delay renewable fuses and renewal links. Economy Fuse & Mfg. Co.

429 Distribution Equipment—Detailed information on company's line of electrical distribution equipment is presented in this 82-pp '58 Marketeer, Catalog M-158. Among equipment described are Electrostrip multi-outlet assemblies, switches, lighting panelboards, power panelboards, switchgear assemblies, and various types of electrical duct. Tables of essential data included. BullDog Electric Poducts Co., Div. I-T-E Circuit Breaker Co.

430 Protective Equipment Guide—Form SPD is a 24-pp handbook on selection of protective devices for electric circuits, motors, appliances and apparatus, and is based on 1956 National Electrical Code. Besides providing suggestions on how to select right kind of protection, booklet provides wiring diagrams, motor tables, volt loss tables. Bussmann Mfg. Co.

432 Hydraulic-Magnetic Breakers—Bulletin 301, 16 pp, describes advantages and operation of company's hydraulic-magnetic circuit breakers. Design and construction features are detailed and time-delay curves, specifications and dimensional data included. Heinemann Electric Co.

434 Electrical Equipment—Condensed Catalog No. 4 contains 48 pp of descriptive data on company's line of electrical products, including conduit bodies, conduit fittings, connectors, ground fittings and EMT fittings. Dimensional data and features are shown and sizes given. Gedney Electric Co.

435 Switch Wiring Diagrams—Bulletin 709 is a 36-pp booklet of typical wiring diagrams for across-the-line starting switches. Indexed and arranged for easy use, this booklet serves as a guide to some of the many ways in which this company's manual and magnetic across-the-line starters can be applied. Allen-Bradley Co.

437 Commutator Maintenance—This commutator and slip ring maintenance data file contains information on methods and procedures for more efficient commutation. Individual bulletins cover brushes, sparking, picking, dragging and other troubles, maintenance tools and how to use them, trouble shooting chart and safety. Ideal Industries, Inc.

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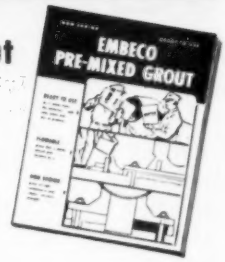

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- Horns and bells call attention to operating hazards, overtaxed equipment or process controls.
- Beacon Ray lights identify and pin point danger areas or summon help.

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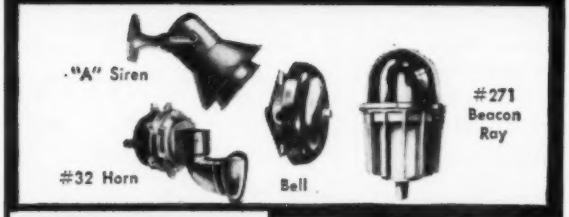

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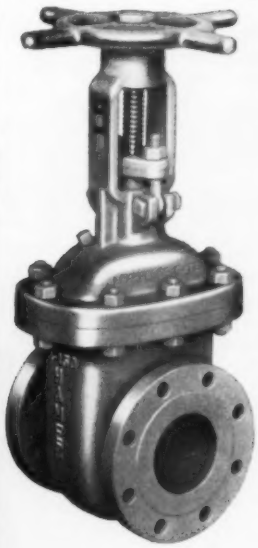
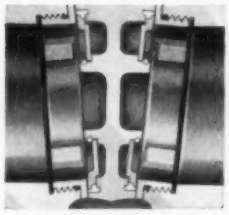
- *Positive Shutoff Upstream — Downstream*
- *Serviceable in the Line*



The new Hamer *Wedge-Seal*, unlike conventional Gates, incorporates a two-way sealing action that insures absolute line shut-off even on lines handling customarily hard-to-hold fluids. As the wedge is lowered to its precision metal-to-metal fit, a Teflon* seal in each side of the wedge compresses against the seats, forming a dual bubble-tight sealing action. Yet, with all of its added sealing quality, the new *Wedge-Seal* costs little more than a regular gate. Send for free literature today. See for yourself how a Hamer *Wedge-Seal* can actually pay for itself.

*RTM DuPont



Renowned for their inert characteristics, Teflon seal rings used in the new Wedge-Seal have amazing durability, can be replaced, when necessary with minimum effort.

Hamer VALVES INC.

2919 Gardenia Avenue, P. O. Box 1851, Long Beach 1, Calif.

Representatives throughout the world

HAMER VALVES, INC.
Box 1851, Long Beach 1, Calif.

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Company_____

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58-3A

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All the installation speed of Flexible Conduit . . . All the protection of Rigid Conduit . . . with

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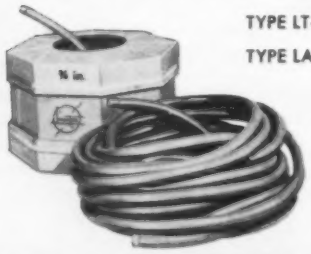
Extruded Polyvinyl Jacket Molded to Galvanized Flexible Conduit

Complete protection against any and all contamination—impervious to water, oils, chemicals, corrosive atmospheres. Installed in minutes. No more "down-time" due to wiring shorts or burn-outs, no more periodic wiring replacements.



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Write for free sample, costs and name of Distributor nearest you.

ELECTRI-FLEX COMPANY

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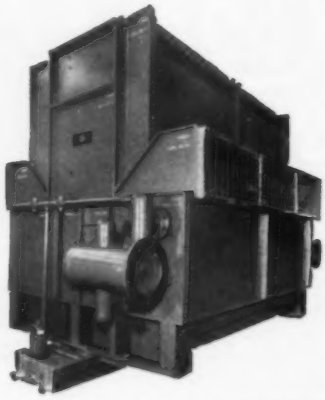
ECONOMICAL COOLING OF GASES AND COMPRESSED AIR



Cooling gases or cooling and removing moisture from compressed air, the Niagara *Aero* After Cooler offers the most economical and trustworthy method. Cooling by evaporation in a closed system, it brings the gas or compressed air to a point below the ambient temperature, effectively preventing further condensation of moisture in the air lines. It is a self-contained system, independent of any large cooling water supply, solving the problems of water supply and disposal.

Cooling-water savings and power-cost savings in operation return your equipment costs in less than two years. New sectional design reduces the first cost, saves you much money in freight, installation labor and upkeep. Niagara *Aero* After Cooler systems have proven most successful in large plant power and process installations and in air and gas liquefaction applications.

Write for Descriptive Bulletin 130.

NIAGARA BLOWER COMPANY

Dept. PE-9, 405 Lexington Ave., New York 17, N. Y.

Niagara District Engineers in Principal Cities of U. S. and Canada

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DATA FILE

(Begins on page 226)

LIGHTING, COMMUNICATIONS

438 Illumination Design Data—Basic reference data on interior lighting installations is contained in 48-pp Manual A-4854, which features a section describing footcandle levels required for each group of seeing tasks. These footcandle levels are then related to many kinds of rooms and areas. Westinghouse Electric Corp.

439 Lighting Units—Data sheets to be added to Section 30 of company's product catalog are now available. These cover application, construction, installation and wiring of company's lighting units for various duties. Installation and construction details are diagrammed. Day-Brite Lighting, Inc.

440 Incandescent Lighting—The 24-pp "Incandescent Lighting Guide Book" features sections on the general advantages of incandescent lighting, the history of incandescent lamp developments, and includes chapters on basic types, bulb shapes, sizes, glass types and finishes, and types of bases. Sylvania Electric Products Inc.

441 Lighting Maintenance Tips—Principles and advantages of good lighting practice are presented in this 48-pp lighting maintenance manual. Much useful information has been added to this revised edition, including a guide to trouble shooting fluorescent installations, a section on planning group replacement of lamps, and a section on planning a program for cleaning lamps. Champion Lamp Works.

442 Lighting Equipment—Bulletin 2697, 52 pp, contains detailed information on a line of lighting equipment, including floodlights, searchlights, industrial lighting and fixture condulets. Two new items—mercury vapor floodlights and vapor master lighting fixtures—are covered. Crouse-Hinds Co.

443 Signal Equipment—Tips on how to select suitable signals for any specific operations are offered in Bulletin

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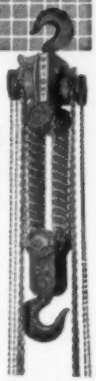
Your Best Buy for Rigging and Maintenance Work



12 Sizes

½-ton to 50 tons

Bulletin 412A gives complete details on the many outstanding features that make Wright Safeways your best buy for long, trouble-free life. Write York, Pa. for your copy.

Some Safeway Features

Load Chain is finest alloy, every foot proof-tested...heat treated for hard wear-resistant working surface...ductile to withstand shock loads..."wick" lubricated...anti-rust zinc coat.

Load and Idler Sheaves rotate on life-lubricated, antifriction bearings...minimum of 5 pockets in Big Sheaves for efficiency and long life.

Gears, Pinions, Drive Spindle (also top and bottom Hooks) are nickel-chrome-molybdenum alloy steel mounted on heavy-duty, antifriction bearings. *Gear Train* is enclosed in oil-tight chamber.

Load Brake is Weston type, silent, dependable.

Steel Housing fully protects vulnerable parts.

Wright Hoist Division
AMERICAN CHAIN & CABLE

ACCO

York, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

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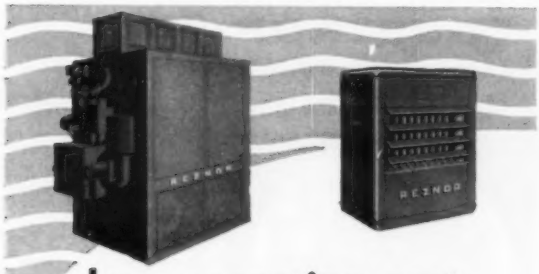

low operating cost

Fuel cost is the total cost of operating Reznor gas unit heaters — and you pay only for the heat you actually need and use. Reznor heat is produced and distributed right at the point of need . . . eliminating transmission losses and costly stand-by firing of boilers. These completely automatic units don't require a licensed fireman . . . they don't require any operating labor at all.

LOW OPERATING COST is just one of many reasons why Reznor gas unit heaters are right for so many plant heating jobs. Whether you need one heater to eliminate a "trouble" spot or enough units for a complete plant heating system, ask your Reznor distributor for the complete story or write for your free copy of "Modern Heating."

Look for Reznor under "Heaters-Unit" in the Yellow Pages

REZNOR
WORLD'S LARGEST-SELLING DIRECT-FIRED
UNIT HEATERS

Reznor Manufacturing Company, 91 Union Street, Mercer, Pa.

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ANOTHER PLANT SOLVES HEAVY-DUTY FLOORING PROBLEMS

This plant, where heavy machine parts are made, installed Stelcon prefabricated floor sections that:

are ready for instant use,

provide strong, removable, replaceable flooring,

combine both sub-floor and wearing surface.

Maintenance is reduced to replacement of individual 6'8" square sections—a quick easy job while the work goes on.

Movable sections make plant layout changes easy. Change plant layout simply by preparing a new aisle surface to accommodate the portable floor sections, lifting them from one aisle location and dropping them into the other.

Smooth floors save materials handling equipment. Rough floor surfaces make electric lift trucks vibrate, sometimes so much that a load will shift dangerously. This vibration increases truck maintenance costs. Stelcon floor sections keep traffic aisles smooth. If a section is damaged you replace it at once. If uneven traffic wears some portions of an aisle more than others, you just switch the sections around like tires on a car.

Unusual strength. Tests show breaking of Stelcon flooring surface at 12,000 psi compared with normal concrete breaking at 3,000 psi. This superior strength is due to a revolutionary, double-reinforced construction. In each prefabricated unit is a sub-floor of special concrete reinforced with ⅛" and 3/16" mesh, topped by a 5/16" wearing surface of straight Portland cement and steel chippings (no sand or other aggregate), all encased in an angle iron frame deeply anchored in the concrete.

FREE BULLETIN: *Send the coupon for our new bulletin Number 7 describing Stelcon's unique solution to industrial flooring problems.*

Stelcon "Best where conditions are worst"

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165 Broadway, New York 6, New York — Tel. BEekman 3-8146

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STREET ADDRESS _____

CITY _____ ZONE _____ STATE _____

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DATA FILE

(Begins on page 226)

100. Describes horns, bells, warning lights, other signal equipment. Specifications, photos, wiring diagrams, dimensions, audibility rating charts, electrical characteristics and other data included. Federal Sign & Signal Corp.

OTHER EQUIPMENT

444 Products and Services—Bulletin GSP-901 24 pp, describes products and services of this company and its various divisions. These include ring balance instruments, components for control systems, electronic devices, force measuring devices, water and steam treatment, testing equipment. Hagan Chemicals & Controls, Inc.

445 Preheating Combustion Air—This well-illustrated 36-pp booklet explains fuel savings and increased performance made possible by using waste heat in flue gases to preheat incoming combustion air. Also covers increased boiler output, ability to use lower grade fuels. Air Preheater Corp.

446 Overheat Protection—Bulletin MOPRI-1, 8 pp, describes design and operation features of inherent overheat protectors — small devices built into electric motors to turn power off when windings get too hot. Includes photos and wiring diagrams illustrating operation. Spencer Thermostat Div., Metals & Controls Corp.

447 Phenolic Plastics—A primary evaluation of the properties of company's phenolics and the combinations in which they are available, in thermosetting molding materials and industrial and coating resins, is featured in this illustrated bulletin. Durez Plastics Div., Hooker Chemical Corp.

448 Industrial Finishing Equipment—Catalog A 657, 12 pp, describes a complete modern finishing system for cleaning, rust proofing, drying, painting and finish baking. The R. C. Mahon Co.

449 De-Ionization Processes—Various types of de-ionization processes and equipment are featured in Bulletin B-157. Covers mixed bed de-ionization, twin-bed de-ionization, industrial softeners, filters of various types, aerators for gas removal, clarifiers for flocculation, standard package units, power package for boilers and process water. Illinois Water Treatment Co.

450 Draft Starter—Capacity data for Quickdraft units are presented in 8-pp Form QF-SD. Seven capacity tables provide means for determining capacity of standard units when installed under hundreds of different conditions. Quickdraft Co.

451 Brinemaking Manual—Details on modern brine-making methods and equipment are presented in 12-pp Manual 135. Three types of brinemakers are described, as well as a wet salt storage system, and cutaway views are included. Morton Salt Co.

452 Standard Storage Tanks—The broad scope of services to which company's standard storage tanks are put is covered in this 20-pp catalog. Such qualities as versatility and economy are stressed and typical installations are pictured. Engineering standards given. Graver Tank & Mfg. Co., Inc.

453 Industrial Stack—Detailed information on a permanent, low cost refractory smoke stack for commercial and industrial applications is contained in 8-pp Bulletin IS-32. Gives product information, applications with boilers, furnaces, etc. Van-Packer Co., Div., The Flinkote Co.

454 Synthetic Rubber—Applications and characteristics of Viton—a fluorocarbon elastomer—are illustrated and discussed in 8-pp Elastomer Notebook Section 81. Photos showing the material in applications are included. E. I. du Pont de Nemours & Co., Inc.

455 Blending System—The Airmerge system, a means of blending pulverized materials in a silo through quadrant aeration, is introduced in Bulletin B-1. Discusses a typical installation, development of the Airmerge, and principles of blending. An isometric drawing shows how dry materials are homogenized. Fuller Co.

456 Water-Cooled Stoker — Design and operating advantages of the Vibragrate Stoker are outlined in this illustrated bulletin. A large cutaway view details component parts of the stoker. American Engineering Co.

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Here is the inexpensive, easy way to solve your condensation problem once and for all. NoDrip plastic coating acts immediately to insulate and protect tanks, pipes, walls, ceilings, air ducts and other metal equipment against condensation drip, rust and corrosion. NoDrip can be applied by anyone without special experience with brush, trowel or spray. NoDrip is also resistant to acid, alkali and brine... protects concrete, brick, plaster, tile, wood or composition surfaces.

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DUSTKOP "520"

designed to collect dust from single machines

portable — easily installed

DUSTKOP STOPS DUST

Self-contained Dustkop models, like the "520," are practical and effective in collecting dust from single machines. They're designed specifically for service with surface grinders, tool and cutter grinders, offhand grinders, buffers and other small wheel equipment. These units are also easy to install — are actually portable — and very economical to operate.

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Swifty Service says:
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QUALITY ELECTRIC TOOLS

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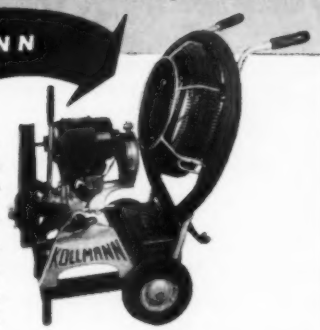
Open plugged drains and supply lines FASTER, BETTER

with a KOLLMANN K-500



● Designed for industrial use, the K-500 makes fast work of stubborn flow line stoppages, eliminates trouble and "down time"... and anyone in the maintenance crew can operate it. The dolly-mounted K-500 handles up to 200' of sectional cable (400' with larger power units) for full-diameter cleaning of lines 3" to 10". Interchangeable clutch jaws quickly adapt it to lines as small as 1¼". *Every* maintenance department can readily justify this machine ... it will pay for itself many times over.

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KOLLMANN MANUFACTURING COMPANY
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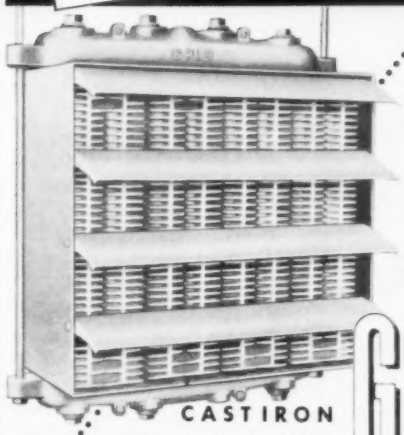
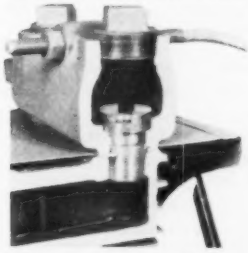
Corrosion in heating equipment Ends



when you install GRID CAST IRON STEAM HEAT TRANSFER SURFACE

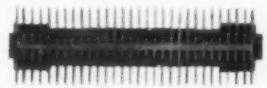
UNIT HEATER MAINTENANCE ENDS TOO!



Top and bottom manifolds connected to fin sections by special threaded nipple.

You once and for all eliminate internal electrolytic corrosion because all metals in GRID Cast Iron Steam Heat Transfer Surface that are in contact with steam are similar . . . not 2 or 3 different metals that promote corrosion to cause leaks and breakdowns. GRID Cast Iron Steam Heat Transfer Surface also eliminates external corrosion because its cast iron construction resists any acid fumes in the air. When corrosion in heat transfer equipment ends, maintenance ends.

GRID Cast Iron construction eliminates the use of reducing valves where high steam pressures are used. It is designed to withstand steam pressures up to 250 P.S.I. . . . 450° temperature. GRID Cast Iron Steam Heat Transfer Surface does away with replacement costs because GRID is built to last for years . . . operating successfully without maintenance in many plants since 1929.



All cast iron one-piece single chamber fin section in Models 1000 and 1200 . . . Note wide fin spacing.

All cast iron one-piece double fin section in Models 1500 through 3000 . . . wide fin spacing prevents clogging . . . easily cleaned.

Send for the complete story on GRID Unit Heaters, GRID Blast Heaters, and GRID Radiation for industrial plant use . . . it is contained in GRID Products Catalog No. 956. Write today for your copy.

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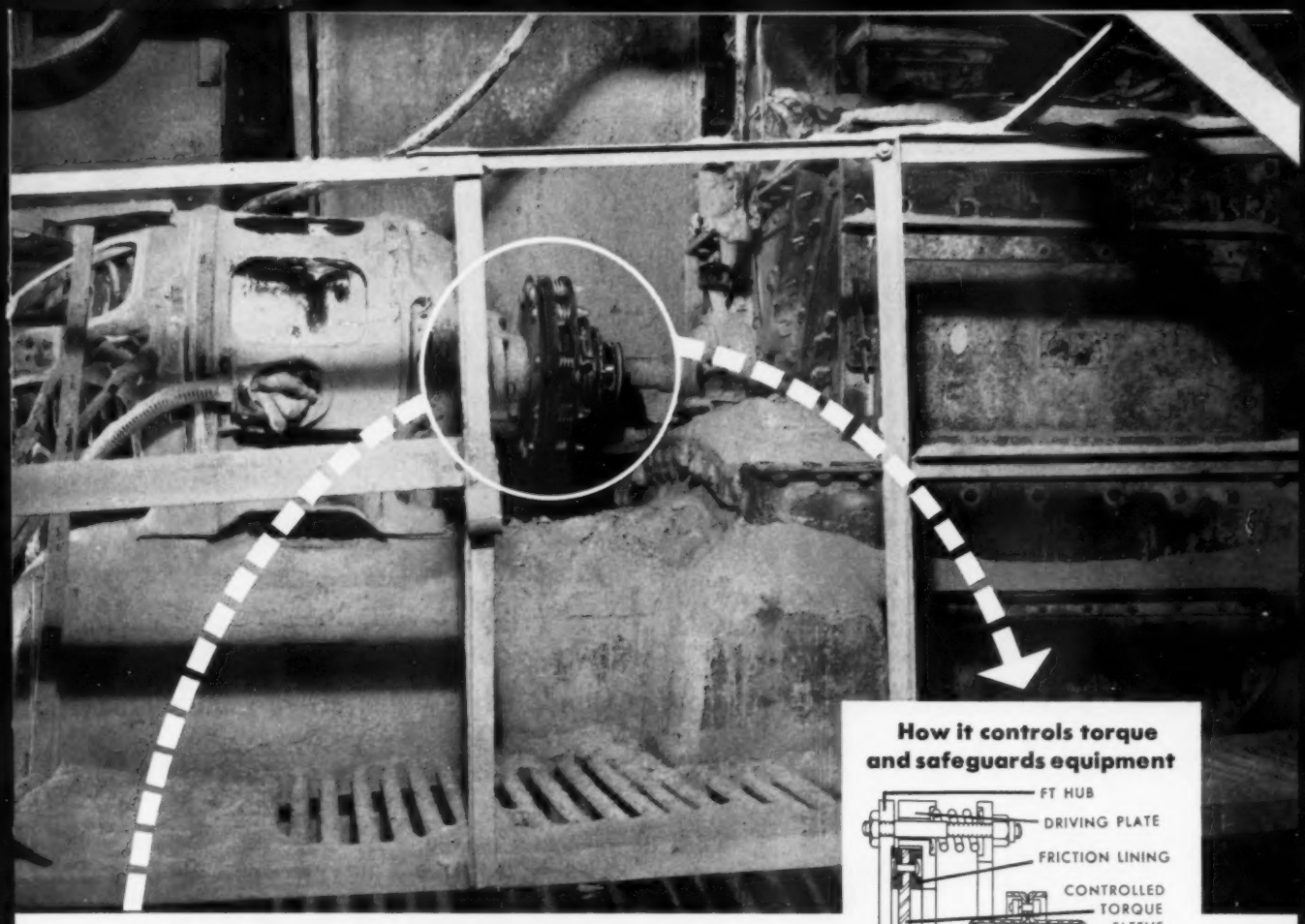
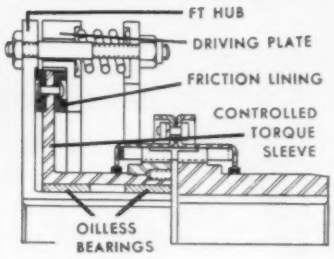


How it controls torque and safeguards equipment



Protect machines from overload damage with FALK Controlled Torque Couplings

The above picture shows a Falk Controlled Torque Coupling connecting a 150 hp motor to a hammermill. Formerly, when tramp iron got into the mill, it was necessary to rewind the motor at least twice a year. But, in the 2½ years after installing a Falk Controlled Torque Coupling, no motor repairs were required. *That is real saving!*

Wherever overload danger exists, a Falk Controlled Torque Coupling gives positive protection against machinery damage from excessive torque or jams. This unique coupling has an adjustable friction slip clutch which can be set at *any* predetermined torque limit. Thus, transmission of dangerous shocks is prevented...overloads are limited...shaft breakage is eliminated.

Another big advantage is that, when the cause of the overload is removed, the entire coupling will rotate and transmit power without resetting, and *without replacing parts or repairing the coupling*....And, the Controlled Torque Coupling incorporates the famous Falk Steelflex torsional resilience to smother ordinary shock and vibration, plus the ability to accommodate shaft misalignment....Consult your Falk Representative or Authorized Falk Distributor. **Ask for Bulletin 4100.**

THE FALK CORPORATION, MILWAUKEE 1, WISCONSIN

MANUFACTURERS OF QUALITY GEAR DRIVES AND FLEXIBLE SHAFT COUPLINGS

Representatives and Distributors in many principal cities.

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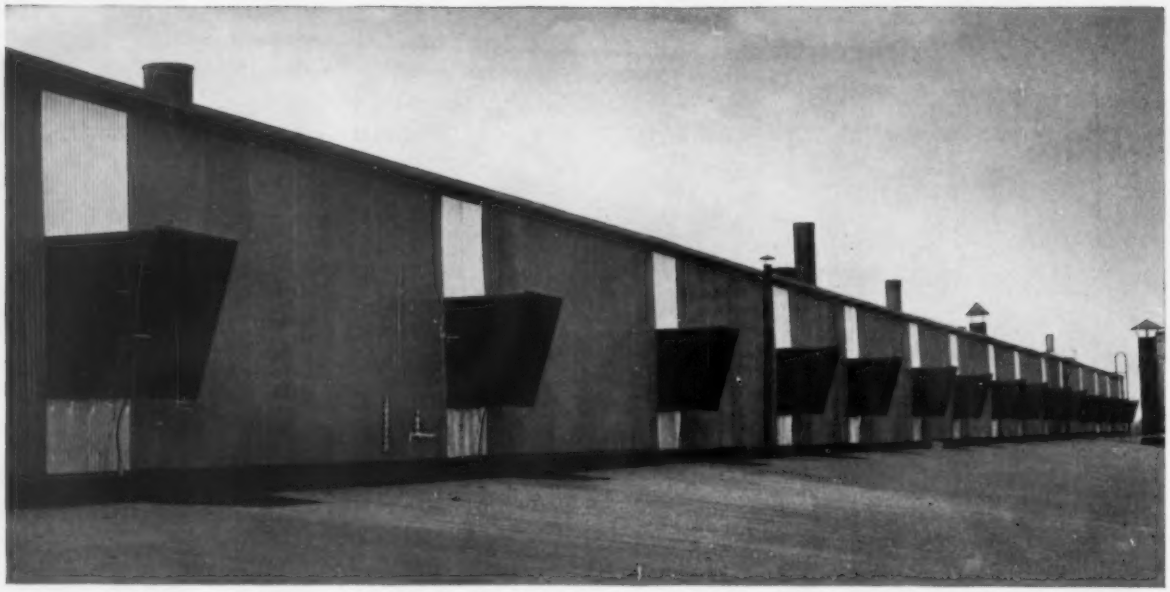
Here (as in photo), the torque-control hub is shown mounted on driving shaft. From this hub, power is transmitted through friction lining to controlled torque sleeve. Load to be transmitted is determined by the (pre-set) pressure on friction lining. In case of overload, this hub still rotates until power is shut off—but the rest of the coupling and the driven machine will slow down or stop.

Motor Shut-off Control

By adding an automatic cut-out switch with V-belt connection to driven shaft, motor can be stopped immediately. With the standard hub mounted on driven shaft, the switch opens the electric circuit when speed of switch falls below predetermined value.

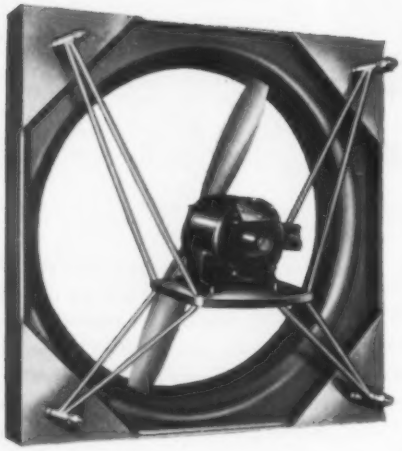
FALK

...a good name in industry



How a wise plant modernization program produced more effective ventilation:

Hartzell Panel Fans Replace Monitor Windows



Hartzell square steel panel mountings mean real savings on installation costs for many applications. Any standard or Lo-Noise Hartzell propeller in 24", 28", 32", 36", 44" or 48" diameters is available in this type of construction.

When the monitor windows in this large eastern metal-working plant required repairs, they were removed and replaced with Corrulux translucent panels. Twenty-nine Hartzell 44" direct-drive panel fans were installed to give positive, effective ventilation in place of the uncertain, erratic ventilation achieved by natural draft through the old tilting windows. Improved ventilation throughout the building was an immediate result. The fans were installed with motors on the outside so that all maintenance can be handled from the roof.

This installation suggests one of many ways in which Hartzell fans can be used to improve general plant ventilation. If it is adaptable to your plant, you'll find it a highly economical solution. But no matter what your plant ventilation problem, Hartzell has the fan or ventilator to help you solve it . . . and your nearby Hartzell field engineer has the ventilating "know-how" to help you plan the best installation at the lowest possible cost. If you don't know him, drop us a line for his name and address.

This installation was handled by the Hartzell field office at 333 Arch Street, Camden, New Jersey; phone WOodlawn 4-5256.

Why You Can Count on Hartzell Air-Moving Equipment for Long Life Rugged Reliability and Minimum Maintenance

Hartzell fans and blowers are engineered and built for the exacting requirements of tough industrial service. There's no compromise with quality for the sake of shaving a few dollars on price. Hartzell fans are designed for the industrial buyer who is willing to pay for long life, dependable service and low maintenance.

HARTZELL
PROPELLER FAN CO.
Div. of Castle Hills Corp.
51 Thomas Blvd. • Piqua, Ohio

ENGINEERING OFFICES IN PRINCIPAL CITIES

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ASK THE MEN IN THE PLANT!

They'll Tell You the Thing They Want Most in a Safety Switch is **SAFETY THEY CAN SEE** *—and that means*

VISIBLE BLADES

The men who pull the switches will tell you what can happen when a switch, *believed* to be open—*isn't.* A lot of things can happen—and every one of them is bad. Personnel is in danger. Motors can single-phase. Machinery and work can be damaged. Down-time can skyrocket.

Doesn't it make sense to insist on Visible Blade construction which gives you a road block against any of those possibilities? Doesn't it make equally good sense to insist on the safety switch which gives you that construction—plus a lot of other performance advantages?

EC&M HEAVY INDUSTRY ELECTRICAL EQUIPMENT...NOW A PART OF THE SQUARE D LINE

SQUARE D COMPANY

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Millions of operating dollars are waiting to be saved

(by plant managers who adopt organized lubrication)

Concept of Organized Lubrication to save cash in 5 areas of plant operation is proving to be a most fertile field for plant-wide cost control. Two reports now available from Texaco on opportunities, methods, case histories.

"Millions of dollars have already been saved in the operating costs of plants where management has recognized the importance of lubrication and has organized planned lubrication programs. Millions of dollars are waiting to be saved in plants where management has not yet become aware of the benefits of organized lubrication."

The entire July, 1958, issue of *Lubrication* magazine is devoted to "Organized Plant Lubrication." The statement above summarizes the issue's findings.

In effect, this and other writings on the subject reflect the fact that here is a relatively new and certainly fertile field for real cost savings in plant operations.

There's enough evidence in to cause excitement among the experts. Among the experts are the men who are putting Organized Lubrication to work—the plant managers and their team of engineers.

For, in assuming the large burden of satisfying the corporate measure of profit and loss on their units, plant managers have been quick to adopt new concepts and practices that result in plant-wide savings, such as planned overhaul, professionalized purchasing and organized quality control.

Most of these have been cost-controlling programs. So is Organized Lubrication. From the evidence in so far, this can prove to be one of the most fertile of the new plant managing practices.

Why? *Because Organized Lubrication can create cash savings in five ways; in inventory, production, downtime, maintenance and equipment life. Once adopted as plant practice, Organized Lubrication is placed in harness by plant engineers, production superintendents, maintenance superintendents, and purchasing agents.*

Let's acknowledge now that lubricants alone, no matter how excellent, are not the secret; rather, it is the setting of goals, the organizing of methods, and the expertness of men who can combine a knowledge of this new opportunity with an understanding of plant practices and lubrication.

In plants throughout the country Texaco's planning book has been studied and put to use. Some large corporations have adopted its recommendations on a staff level, or have set up committees to study the subject. Many plant units report savings from 10 to 100 times the cost of the lubricant used!

If you are a member of a plant operating group, or if you are concerned with cost control in many plants, you will find this subject well worth an introductory 10 minutes or so.

SEND FOR TEXACO'S NEW GUIDE FOR ORGANIZING LUBRICATION

Limited quantity available; please attach coupon to your company letterhead

TEXACO

The Texas Company
Dept. E60
135 East 42nd St.
New York 17, N. Y.

Please send me Management Practices that Control Costs via Organized Lubrication.

☐ I would also like the July issue of *Lubrication* Magazine (published by Texaco).

Name_____ Title_____

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OCTOBER, 1958

Plant Engineering

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The magazine that helps plant engineers with their everyday problems

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